THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIII. No. 1361.] LONDON, JUNE 11, 1889. [41ST YEAR. Price 6d.

WOLSTON'S Paste and Ready Mixed for Use.

Warranted Free from Adulteration. **TORBAY PAINTS.**

FOR GASHOLDERS, &c., &c.

The Original "Torbay Paints"

As supplied during many years to the LONDON GASLIGHT & COKE COMPANY.

TORBAY & DART PAINT Co., Ld.,

23, Gt. George St., Westminster, S.W.

DARTMOUTH, & BRIXHAM (TORBAY).

— ESTABLISHED 1830. —

PARKER & LESTER,

Manufacturers & Contractors.

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT,

Parker's Imperial Black Varnish,

Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:

ORMSIDE STREET, OLD KENT ROAD, LONDON.

Ashmore, Benson, Pease, & Co., Ld.,

STOCKTON-ON-TEES

Manufacturing Gas Engineers.

See Advertisement, p. 1018.

CEMENT

EARLE'S BEST PORTLAND CEMENT

MANUFACTURED BY

GEO. & THOS. EARLE, HULL.

PROMPT DESPATCH:

Seven Jetties on the River.

Two Private Railway Sidings.

FACILITIES FOR DESPATCH:

Six Railway-Waggon Entrances with Steam and Hydraulic Cranes.

Four Rully Entrances.

Three different Railway Companies within easy cartage distance.

Storage Capacity 8000 tons.

Office: 7, PIER STREET.

Works: WILMINGTON.

ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY.

"Abyssinian" Tube Wells.

Pure Water Supplies

LE GRAND & SUTCLIFF, 100, BUNHILL ROW, LONDON.

R. Dempster & Sons, Ltd.

GAS, CHEMICAL, & HYDRAULIC ENGINEERS & CONTRACTORS, ELLAND, YORKS,

Makers of **Reciprocating Pump Exhausters**, and of the **Elland Rotary Exhauster**, which cannot be surpassed for efficiency or superiority of workmanship.

Of the Two Sets fixed at Migan, each of which passes 80,000 cubic feet of Gas per hour, Alderman James Smith says: "Your Exhausters have given us the most complete satisfaction, and are well made and highly finished." Mr. Timmins, Engineer, says: "The results I have attained with your Exhausters are most satisfactory. I have a perfect gauge; they work noiselessly; and the workmanship and material are excellent throughout."

GASHOLDERS of any size, SCRUBBERS, CONDENSERS, PURIFIERS, RETORT-FITTINGS, and every description of GAS and CHEMICAL PLANT.

Makers of LIVESEY'S PATENT WASHERS (for the Colonies and Abroad).

ESTIMATES, PRICES, AND FULL PARTICULARS ON APPLICATION.

NOTE THE ADDRESS— **ELLAND, YORKS.**

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS,

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.,

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

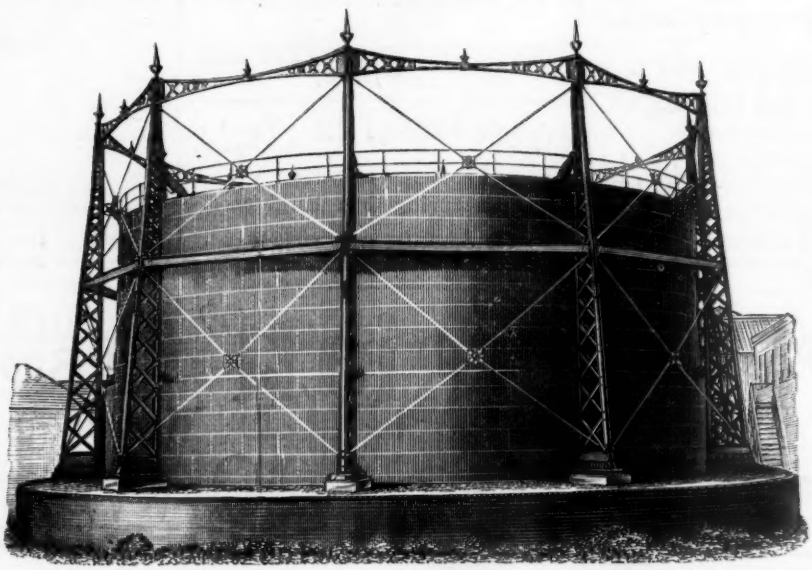
TELEGRAPHIC ADDRESS: "COCKEYS FROME."

EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers, Ironfounders, & Contractors,

Manufacturers of *GASHOLDERS and TANKS, BOILERS and ENGINES, ROOFS, EXHAUSTERS, BREEZE SCREENS, CHARGING and COKE BARROWS.*



Manufacturers of *PATENT WASHERS, PATENT VALVES for PURIFIERS, &c., GOVERNORS, LAMP COLUMNS, Weighbridges, COKE BREAKERS.*

SOLE MAKERS OF COCKEY AND SMITH'S PATENT SELF-ACTING BYE-PASS VALVES.

Estimates for any description of Gas Plant on application.

THE IRON-WORKS, FROME SELWOOD, SOMERSET.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE AND OTHERS.

—11 MEDALS.—

MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street

BIRMINGHAM: 114, Colmore Row.

LEEDS: 6, Mark Lane, New Briggate.

THOMAS PIGGOTT & CO.,

(ESTABLISHED 1822)

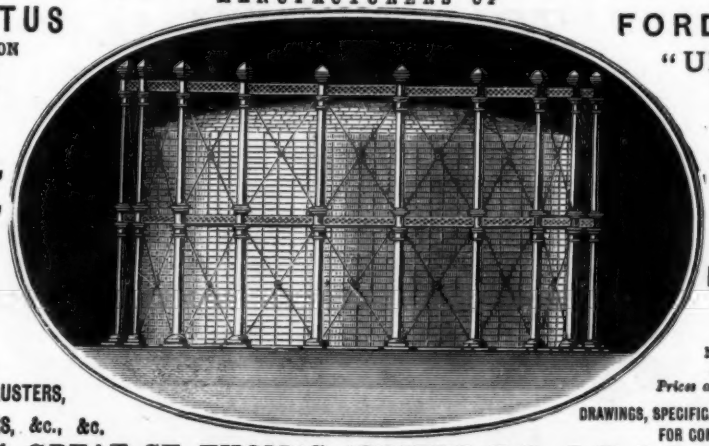
SPRING HILL, BIRMINGHAM,

MANUFACTURERS OF

GAS APPARATUS
OF EVERY DESCRIPTION
INCLUDING
GASHOLDERS
and Tanks,
Retorts, Purifiers,
Valves, Scrubbers,
Condensers,
ETC., ETC.

All of the most approved Designs.

BOILERS, ENGINES, PUMPS,
BEALE'S and other EXHAUSTERS,
METERS, GAUGES, GOVERNORS, &c., &c.



FORD'S PATENT
"UNIVERSAL"
SCRUBBER-
WASHER.
Numbers at work, giving excellent results.
No Motive Power Required.

ALSO OF
SOMERVILLE'S PATENT
RETORT MOUTHPIECES
AND
SELF-SEALING LIDS.
NO LUTING REQUIRED.

Prices and Particulars on application.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES PREPARED FOR COMPLETE GAS PLANT.

London Offices: 14, GREAT ST. THOMAS APOSTLE, E.C.—J. E. & S. SPENCER, Agents.

ESTABLISHED 1825.

GAS TUBES

MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

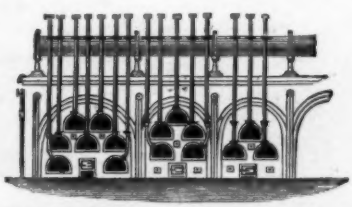
MANUFACTURERS OF

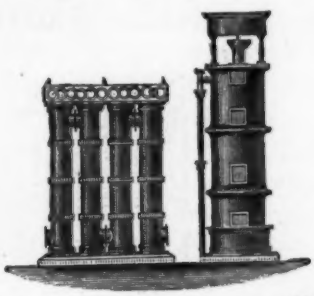
SLIDE VALVES,
WITH RACK & PINION,
OR
Internal or External
SCREWS, of all Sizes.
GASHOLDERS,
AND
Gasholder Tanks.

CAST-IRON RETORTS,
RETORT-BED FITTINGS,
AND RETORT-HOUSE APPLIANCES
of every description.
Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

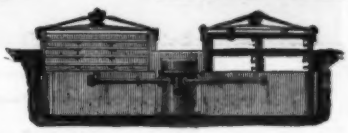
WROUGHT AND CAST IRON
CONDENSERS,
SCRUBBERS, & WASHERS
TAR AND LIQUOR PUMPS, &c.

PATENT
CENTRE VALVES
for working Purifiers.
Also Bye-Pass & Stop Valves.





PURIFIERS with Planed Joints.
HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS.
WOOD GRIDS.
CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

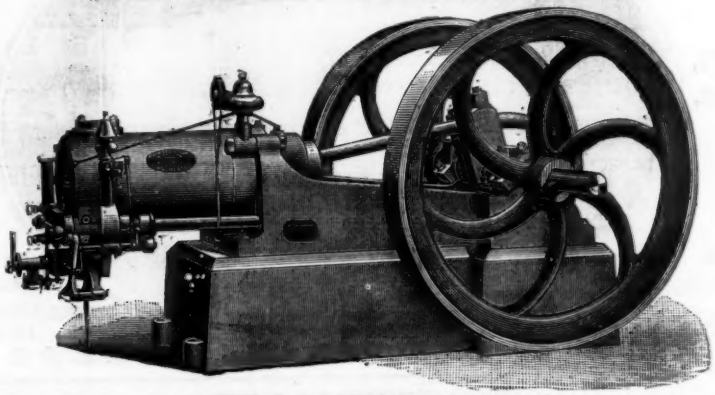
MADE in SIZES
2 Man to 100 HP.

GAS-ENGINES
COMBINED
WITH
PUMPS
FOR
TOWNS SUPPLY,
SEWAGE, &c., &c.

GAS-ENGINES
COMBINED
WITH
AIR COMPRESSORS
FOR THE
SCHONE SEWAGE
SYSTEM, LUCIGEN
LIGHT, &c.

70 Prize Medals.

NEW 14 H.P. NOMINAL SIZE.



MADE in SIZES
2 Man to 100 HP.

VERTICAL
AND
HORIZONTAL
TYPES.

ENGINES
COMBINED
WITH
HOISTS, PUMPS,
DYNAMOS, &c., &c.

Largely used for
EXHAUSTING,
PUMPING,
COKE CRUSHING,
ELECTRIC LIGHTING,
&c., &c.

Over 27,000 "OTTO" ENGINES have now been made.

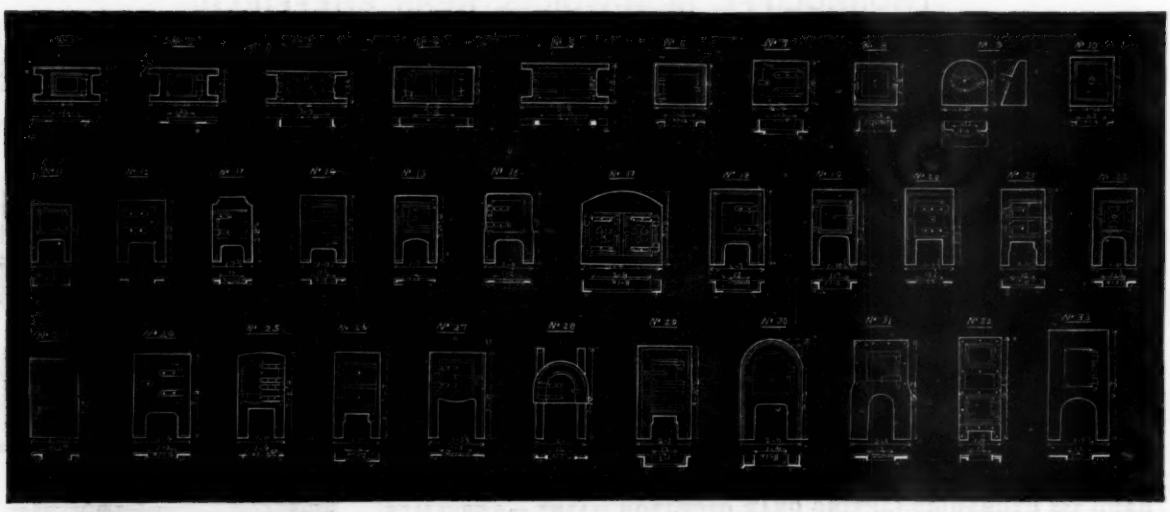
CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,
LONDON,
LIVERPOOL,
GLASGOW,
NEWCASTLE.

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

R. & J. DEMPSTER,

Engineers, Ironfounders, and Contractors,

GAS PLANT WORKS, NEWTON HEATH, MANCHESTER.



RETORT MOUNTINGS.

Furnace Doors and Frames suitable for Generator, Regenerator, and ordinary Retort Furnaces.

Patterns for other Designs made to Order.

KIRKHAM, HULETT, & CHANDLER, Ld.,

PALACE CHAMBERS,

9, BRIDGE ST., WESTMINSTER.

Mr. S. HERSEY, Managing-Director.

IMPORTANT NOTICE!

THE "NEW" PATENT

"Standard" Washer-Scrubber

(Thoroughly extracts every grain of Ammonia and a large quantity of other Impurities from Gas)

Has been for many months in successful and satisfactory operation at

The Gaslight and Coke Company's Station at

BECKTON,

Resulting in a second order just received to fit up a Washer-Scrubber, of 2½ millions capacity, upon this new principle, at the same station. Other orders for these machines are in course of execution.

A very large amount of patronage has been accorded the "Standard" Washer-Scrubber, of which, up till now, **367** have been supplied, representing a daily make of **318,260,000** cubic feet of gas; but the advantages of the "**New Standard**" will be readily recognised, and its superiority over the present "Standard" may be briefly summarized as follows:—

1. The weight in motion is **only one-seventh** of that in the present machine.
2. It requires only **one-seventh** the power to drive; consequently effecting a large reduction in cost of Engine as well as in steam power.
3. **The Wear and Tear is enormously reduced,** as the Shaft has comparatively little weight to carry.
4. It has been found that the washing surfaces **keep perfectly clean** and free from deposit from end to end of the Machine.
5. It is so constructed that it forms a most powerful, effective, and complete system of purification, gives no pressure, and can be removed and replaced without trouble or injury.
6. The "New Standard," owing to the foregoing, can be supplied at **a large reduction in price.**

Engineers desirous of working Ammoniacal Liquor over and over again prior to leaving the "New Standard" can do so by the automatic and simple arrangement which forms part of this patent.

The Apparatus can be applied to "Standard" Washer-Scrubbers already in use.

Particulars will be furnished upon application to the above address.

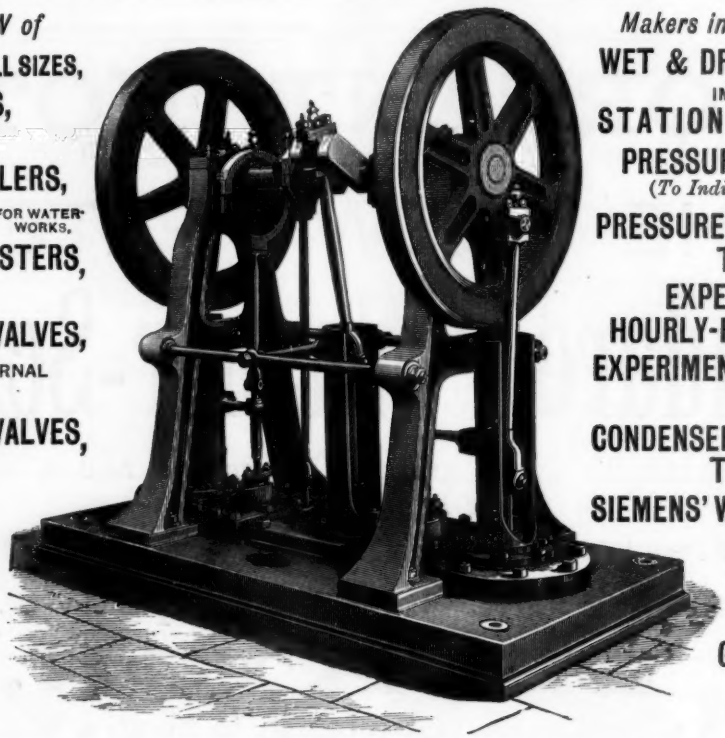
R. LAIDLAW & SON,

GAS AND WATER ENGINEERS.

Manufacturers of **GAS APPARATUS** of every Description.

Makers in GLASGOW of

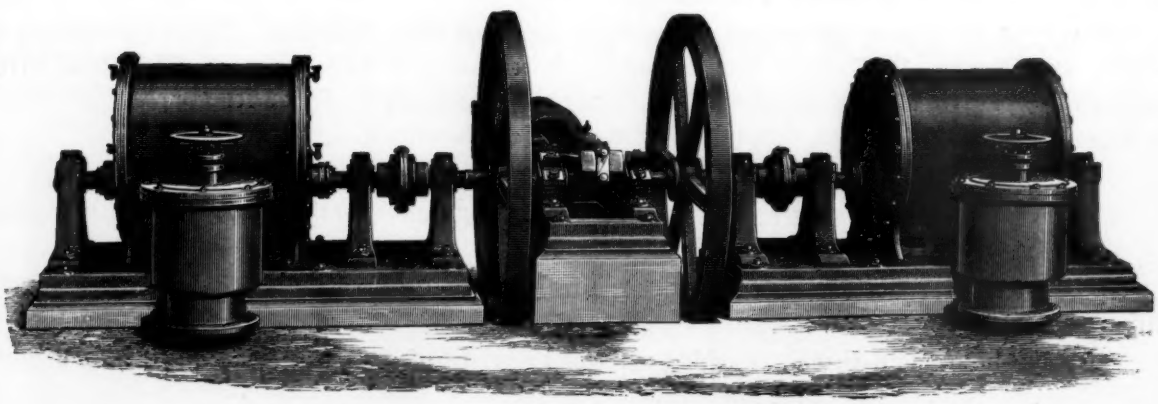
CAST-IRON PIPES, ALL SIZES,
LAMP PILLARS,
STEAM-ENGINES AND BOILERS,
PUMPING ENGINES FOR WATER-WORKS,
BEALE'S GAS EXHAUSTERS,
DOUBLE-FACED SLUICE VALVES,
INTERNAL AND EXTERNAL RACK OR SCREW SLIDE VALVES,
CAST-IRON COLUMNS,
BEAMS, GIRDERS, AND WATER-TANKS,
WROUGHT-IRON TUBES, FITTINGS, &c.



Makers in EDINBURGH of

WET & DRY GAS-METERS,
IMPROVED STATION GOVERNORS,
PRESSURE REGISTERS (*To Indicate New Time*),
PRESSURE GAUGES,
TEST HOLDERS,
EXPERIMENTAL HOURLY-RATE METERS,
EXPERIMENTAL TEST METERS,
CONDENSER THERMOMETERS,
SIEMENS' WATER-METERS,
STREET LANTERNS,
And all Kinds of GAS APPARATUS AND FITTINGS, &c.

PUMPING GAS EXHAUSTER AND ENGINE COMBINED. All Sizes.



BEALE'S GAS EXHAUSTERS AND ENGINE COMBINED. All Sizes.

Prices, with full Particulars, will be given on application.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,
INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

TANGYES LIMITED

CORNWALL WORKS, BIRMINGHAM.

LONDON: 35, Queen Victoria Street, E.C.
NEWCASTLE: St. Nicholas Buildings.
MANCHESTER: Deansgate.
GLASGOW: Argyle Street.
PARIS: Place de la Republique.
SYDNEY: 119, Bathurst Street.
MELBOURNE: Collins Street West.

SOLE MAKERS OF THE

"SPECIAL" STEAM PUMP

FOR PUMPING

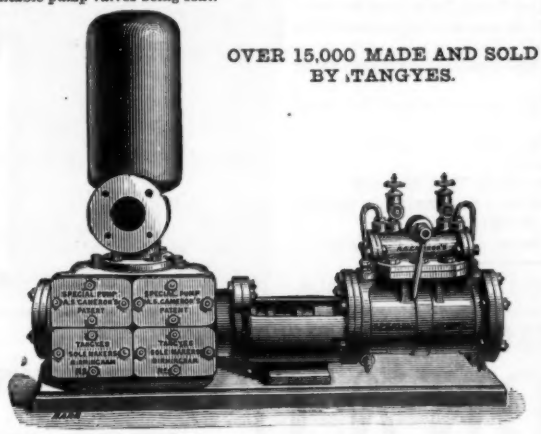
AMMONIACAL LIQUOR, TAR, & WATER IN GAS-WORKS.

Used in the Principal Gas-Works in the United Kingdom.

REDUCED PRICES.

The "Special" Double-Acting Steam-Pump is now made in some 250 sizes, and of many different designs, to suit particular requirements.
In ordering, state the purpose for which the Pump is required, to ensure suitable pump valves being sent.

OVER 15,000 MADE AND SOLD BY TANGYES.



In case of Special Quotations, the following particulars are required:—
Pressure of steam at cylinder.
Number of gallons to be raised in a given time.
The height of lift from level of water to point of delivery.
The nature of the fluid to be pumped.

The "Special" Steam-Pump can be worked by Compressed Air. For pumping Tar or Ammoniacal Liquor, the "Special" Steam-Pump is made with extra long distance piece, for which an additional charge is made.
The quantities of Tar delivered should be taken as about two-thirds those of water given below.

SIZES SUITABLE FOR GAS-WORKS.

Diam. Steam Cyl. ins.	3	3	4	4	4	5	5	5	5
Diam. Water Cyl. "	1½	2½	2	3	4	2½	3	4	5
Length Stroke . . "	9	9	9	9	9	12	12	12	12
Gals. per hour, approx.	450	1800	800	1800	3200	1250	1800	3200	5000
Diameter Suction and Delivery . . . ins.	1	2½	1½	2½	2½	3	2½	3	3½
Price . . . . . £	9	12	11	13	15	15	16	19	22

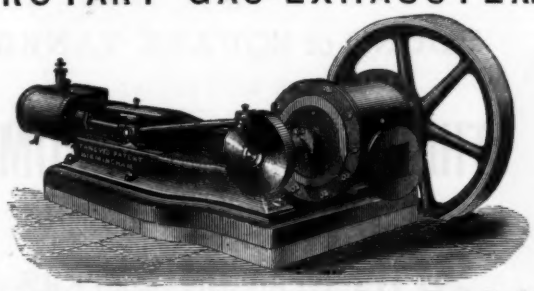
Diam. Steam Cyl. ins	6	6	6	6	7	7	7	7	7
Diam. Water Cyl. "	3	4	5	6	3	4	5	6	7
Length Stroke . . "	12	12	12	12	12	12	12	12	12
Gals. per hour, approx.	1800	3200	5000	7200	1800	3200	5000	7200	9800
Diameter Suction and Delivery . . . ins.	2½	3	3½	4	2½	3	3½	4	5
Price . . . . . £	17	20	23	26	19	22	25	28	34

Diam. Steam Cyl. ins.	8	8	8	8	8	9	9	9	9
Diam. Water Cyl. "	4	5	6	7	8	5	6	7	8
Length Stroke . . "	12	12	12	12	18	12	12	12	18
Gals. per hour, approx.	3200	5000	7200	9800	12800	5000	7200	9800	12800
Diameter Suction and Delivery . . . ins.	3	3½	4	5	6	3½	4	5	6
Price . . . . . £	24	27	31	36	43	29	34	39	46

Diam. Steam Cyl. ins.	9	10	10	10	0	10	10
Diam. Water Cyl. "	9	5	6	7	8	9	10
Length Stroke . . "	24	12	12	12	18	24	24
Gals. per hour, approx.	16200	5000	7200	9800	12800	16200	20000
Diameter Suction and Delivery . . . ins.	7	3½	4	5	6	7	8
Price . . . . . £	56	32	37	42	50	60	67

TANGYES' IMPROVED

ROTARY GAS-EXHAUSTER.



These Exhausters are supplied with or without Engine. The smaller sizes (Nos. 1 to 6), when supplied with Engine, are mounted on strong cast-iron base plate—as illustrated—which also carries the Engine.

No.	Cubic Feet per Hour.	Inlets and Outlets.	Horse power of Engine.	PRICE.
1	2,000	3 inches.	2	£60
2	3,000	4 "	2	65
3	5,000	5 "	2	75
4	7,500	6 "	3	80
5	10,000	7 "	3	95
6	15,000	8 "	3	115
7	20,000	9 "	4	125
8	30,000	10 "	6	175
9	40,000	12 "	8	210
10	50,000	14 "	10	260

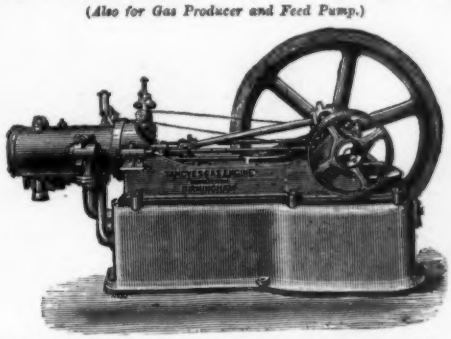
Prices of larger sizes on application.

THE "TANGYE" GAS-ENGINE

(ROBSON'S PATENT)

Royal Cornwall Polytechnic Special Gold Medal, 1882.

(Also for Gas Producer and Feed Pump.)



The ¼, 2½, and 4 horse power sizes are of the type shown in illustration. The 1-horse power size is of the type of the "Tangye" Steam-Engine.

Working size	¼ H.P.	1 H.P.	2½ H.P.	4 H.P.
Test Horse Power	1	1·4	3	6
Revolutions per minute	180	170	170	160
Price, Engine on Base with Tank £	60	82	115	140

Note.—The Test Horse Power in the table above is that given off at the Driving Pulley in actual test with Dynamic Brake at our Works.

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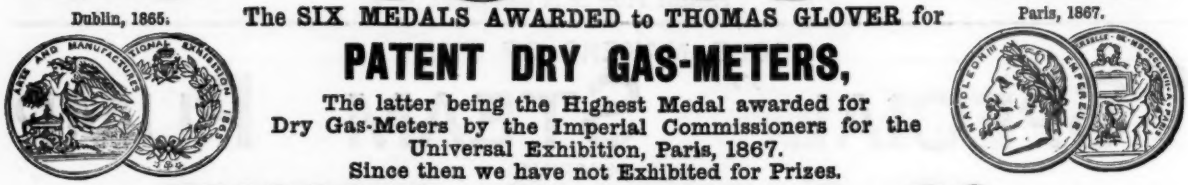
Established 1844.] **ORIGINAL MAKERS.** [Established 1844.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.



The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

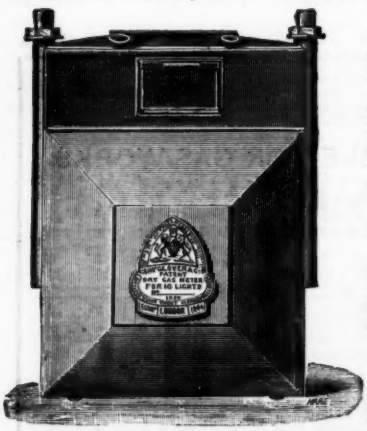
The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

TELEGRAPHIC ADDRESS: "GOTHIC LONDON." TELEPHONE No. 6725



1st—Are a remedy for all the defects of Wet Meters
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by frost, however severe.
5th—Are the most accurate & unvarying measurers of Gas.
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

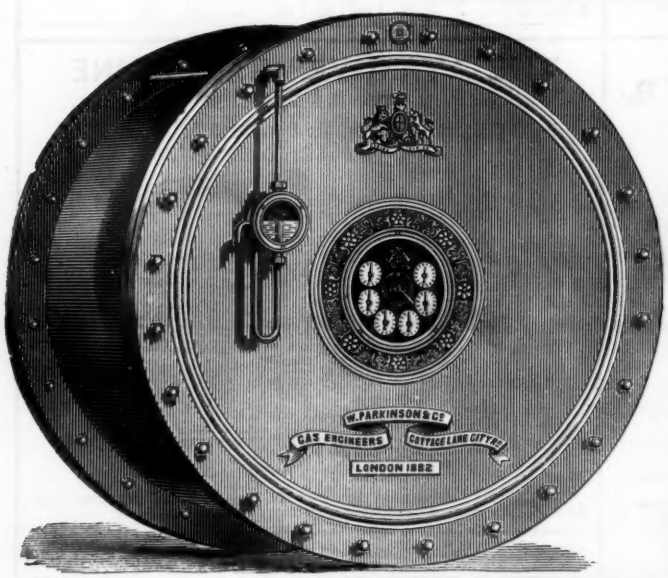
Meters fitted with Grey's Index or Harding's Counter.

HIGHEST AWARD, MELBOURNE EXHIBITION.

W. PARKINSON & Co.,

COTTAGE LANE WORKS, CITY ROAD, LONDON.

TELEGRAPHIC ADDRESS: "INDEX LONDON."



STATION METERS

IN

ROUND or SQUARE TANKS,

FITTED WITH PATENT

THREE-PARTITION DRUMS

MORE THAN

250 STATION METERS,

Varying in size from 1200 to 200,000 cubic feet per hour, have been sold, fitted with

THREE-PARTITION DRUMS,

Since their introduction three years since.

ROUND METERS as above are kept in Stock in all Sizes, ready to send away at the shortest notice. Compact, portable, and very easily fixed. An Improved Overflow Water-line Regulator fitted to every Meter.

PRICES VERY MODERATE.

DURABILITY UNEQUALLED. SOME HAVE BEEN IN CONSTANT USE FOR OVER 60 YEARS.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 11, 1889.

A PLEA FOR A GOOD CANDLE.

As there is a lull in the storm raised a short time since over the photometrical tests of the gas supplied by the London Companies, and no steps in the direction of improving the statutory method of gas examination seem to be contemplated by anybody, the opportunity is not unfavourable for making a suggestion respecting the subject to those whom it may concern. There does not seem to be the faintest hope of getting rid of the legal standard candle for gas-testing. This is the first idea to be taken hold of with all seriousness by gas makers and testers. All the research for a better unit of light that has occupied so much time and been followed so conscientiously of late years, has practically gone for nothing, seeing that it has not resulted in providing a common ground whereon all parties interested in photometry can stand and unite in demanding a change in the law. There is nothing to substitute for the candle but pentane; and pentane is open to the fatal objection that the gas examiner would have to make his own standard gas, unless a more or less complex procedure is devised for overcoming this difficulty. At any rate, the position at present is that the Board of Trade cannot even see their way to promote a permissive alteration of the law relating to gas-testing; and consequently photometry by the candle stands discredited yet compulsory. If therefore the use of the standard candle is to continue obligatory, is there no room for improvement in its manufacture or method of employment, with a view to diminishing the objections to it that have been published with such irritating, because hopeless, reiteration? It is surely the duty of wise men to make the best of the inevitable; and if we cannot get rid of the parliamentary standard candle, let us at least be sure that we do all possible justice to it. Yet this is the point upon which much uncertainty exists. So long as there was a hope of getting rid for ever of the candle standard, it was hardly worth while to propose any measures for improving it; because no alteration of the process of manufacture can remove the fundamental objections to this particular form of standard which have been held sufficient to condemn it. Now that, condemned or not, we are no nearer repeal of the law enacting that the standard unit of light for the measurement of the illuminating power of gas is a sperm candle of six to the pound, than we were ten years ago, it is surely worth while to make as much virtue as possible out of the necessity, and treat the poor discredited candle as fairly as we can.

With regard to the method of using the candle in photometry, it may be fairly supposed that no noteworthy improvement is possible. There is quite a literature about the alignment of wicks, the steadying of flames, the manipulation to secure perfect cups, and the other points of candle photometry. We have no wish, even if we had the power, to add to these rules of candle management. The only thing we have to do at present is to put the two questions: Is the standard sperm candle satisfactorily made? and if not, How can it be improved? Upon the first question it may be said that many photometrists are of opinion that, for all the high price charged for them, the candles sold for this purpose are not so good as they used to be; and that there is a ridiculous inconsistency between the hap-hazard way in which they may possibly be made and the extreme precision with which the photometrist is required to use them. Not long ago Mr. A. Vernon Harcourt himself, going into the provinces to investigate a disagreement between photometrists, found a radical incompatibility in the candles used by the parties. There is no reason why this should be, or why some method of hall-marking candles intended for photometrical purposes should not be agreed upon. The first step to be taken towards the settlement of this matter would be for the Metropolitan Gas Referees, the London County Council, and the Gas Companies over whom they have control in this regard, to agree upon the appointment of a Joint Commission of three, one to be named by each interest, who should be charged in the first place to collect information, and report upon the manufacture of sperm candles for photometrical use. This Committee would take account of the defects and differences of candles, and show how these might be avoided by the adoption of a regular procedure in the manufacture—aiming at securing uniformity in the composition, laying, and tension of the wicks; homogeneity and constancy in the mixture of sperm and wax; and perfection in the moulding. It would be for them to ascertain whether or not it is desirable to establish an official candle factory, or whether satisfactory arrangements for candle making under inspection could be concluded with a private manufacturer. In either case, it could be arranged for standard candles of the certified quality to bear a stamp that might be received as evidence of their uniformity of composition and manufacture. If there is any valid objection to this procedure, it can be advanced in our columns by anyone interested in the establishment of a *modus vivendi* between gas photometrists.

Something will have to be done so as to place the practice of photometry by the candle upon a sounder footing than it occupies at present; and it does not seem reasonable to rest

content without some effort being made to better reconcile the candle as an article of trade with its legal position. If it can be shown that there is no need for the investigation and remedial measures we suggest, let this be done. Otherwise it scarcely seems reasonable to cavil at the candle itself whilst it remains the subject of manufacturing imperfections which are capable of cure by action on the part of the most influential users. London needs more standard sperm candles than any other centre of consumption, and supplies the country and the civilized world. If the Gas Referees or the County Council take the initiative in this matter, buyers of candles generally will be content to profit by the result.

THE DUBLIN GAS COMPANY AND ELECTRIC LIGHTING.

A REMARKABLE Board of Trade inquiry has just been held in Dublin by Major Marindin; the subject being an application by the Alliance and Dublin Consumers' Gas Company for permission to open certain streets in the best part of Dublin for the purpose of laying electric light cables intended for the supply of private houses in the district. The Company contend that they are entitled to supply electric lighting by the terms of their Acts; and that they, therefore, do not require a Licence or Provisional Order under the Electric Lighting Acts, but only the sanction for opening the roads. The Inspector was very careful at the commencement of the proceedings to define the scope of his duty, which is not to pronounce upon the validity of the interpretation put by the petitioners upon the terms of their Acts; but, assuming that they have the right they claim, to ascertain whether it is desirable that they should exercise it. The Company are opposed, of course, by the Corporation of Dublin, who have taken steps to obtain a Licence under the Electric Lighting Act, with the avowed object of checkmating the Gas Company. As the report of the Inspector is not yet published, it is impossible to say what may be the result of the inquiry. The Company are actually exercising in a small way what they regard as their powers of supplying electric light, and admit a loss of £100 a year by it, because of the small number of consumers. For this reason, among others, the Company seek to extend their business, and to substitute costly underground cables for the cheap overhead wires by means of which they have been hitherto supplying current. They charge 8d. an hour for an arc lamp, and 1d. an hour for an incandescent lamp. Whatever may be the end of this inquiry, we take this opportunity for repeating what we have stated in regard to the same subject on previous occasions. We have no sympathy with the view taken by the Directors of the Company of their duty in this matter, and believe them to be wrong in their law, and ill-advised in their policy. Although Major Marindin expressly reserved the question of law, Counsel for the Gas Company could not refrain from stating the ground upon which they base their claim to supply electric light, which is a paragraph in their Act of 1866 stating the objects of the Company to be "the making and supplying gas and other "improved means of lighting for public and private pur-"poses." Counsel went on to say that "having regard to "the fact that electricity was at that time, though not used, "well known as a light, much talked of, and looked forward "to, it had always been maintained by the Company that "under that they had the power of supplying electric light." Mr. W. F. Cotton also, in his evidence, deposed that he remembered when the Act of 1866 was passed, and that the subject of electric lighting was then discussed in gas circles; including the probability of its being a rival with gas for illuminating purposes. Without any desire to prejudge the decision that may ultimately be arrived at by competent authority, we do not hesitate to say that Mr. Cotton will have a difficult task to persuade anybody conversant with the subject that the interpretation forced upon these words of the Act of 1866 is not an afterthought. The Company are, moreover, playing fast and loose in this matter in a way that goes far to forfeit respect. Counsel for the Corporation pointed out that when they gave notice of their intention to apply for a Licence, the Company first opposed them, and then dropped the opposition. Also in their memorial, the Company declared their intention of applying to the Board of Trade for a Provisional Order for electric lighting, which they now pretend to be unnecessary. Finally, it is doubtful if the Company have power to devote legally one penny of their capital to electric lighting; and if they do, they will in all probability lose it. They are actually earning a dividend of 10½ per cent. by supplying gas; and why in the name of common sense they cannot stick to the business that pays, and let alone that in which everybody loses money, is a hopeless mystery. There is every probability that any shareholder could obtain an injunction against the Board, restraining them from sacrificing money in the electric lighting speculation to which they seem so fatuously committed. The Company are losing by it, and it is a source of aggravation of the chronic disagreement between themselves and the Corporation; yet the more law and reason are invoked to put a stop to it, the more obstinately do the Directors cling to their folly. We frequently have occasion to comment upon gas affairs of Dublin; for the Corporation and the Gas Company are never quiet for long. Generally we are able to hold with the Company against the Local Authority; but in regard to this matter of their dabbling in electric lighting, it is impossible to deny that the Company are altogether in the wrong.

THE HALIFAX GAS SCANDAL.

AT last we seem to be in sight of the end of the unpleasant business known to the world as the "Halifax Gas Scandal." The Special Committee of the Corporation who have been secretly investigating the charges made against the late Gas Manager and others, have promised to make their report next month. It was to have been presented at the meeting held last Wednesday; but the Committee sought and obtained an extension of time, on the ground that some of their number are away from home, and meetings are difficult to arrange at this time of the year. The direction given by the Council as to the presentation of the report was, however, of a specific character; and after the promise which has been made by the Mayor, its publication cannot well be delayed beyond the next meeting. When we get it, we shall possibly be in a position to form an opinion as to the kind of evidence which has furnished the Committee with an excuse for the arbitrary proceedings of the past twelve months. No one anticipates any new or startling revelations; but the Committee may, at least, be expected to supply the Town Council with some kind of proof of the sensational charges which their Chairman (the Mayor) has from time to time so confidently, if not recklessly, promulgated. After what occurred at the Council meeting held last week, it may be taken for granted that the Committee have abandoned one, at least, of the apparently strong positions which they took up. When criminal proceedings were instituted against the late Manager for abstracting some leaves from a book kept in his office, it was alleged, as the sole reason for the prosecution, that the sheets contained tests of coal which showed that he had accepted the inferior article of one firm, and had rejected the tender of another contractor, who offered a superior quality of coal at a less price. It was stated in open Court, by Counsel representing the Corporation, that this was presumed to have been done from a corrupt motive; and that, in itself, it was evidence of such motive. The prosecution failed ignominiously in the attempt to establish the criminal charge which they had made; and if any conclusion may be drawn from the most recent proceedings of the Gas Committee of the Corporation, they have little belief left in the truth of the accusation made with so much circumstance six months ago. In letting the new contracts for coal, they have actually given the largest order to the very firm who were previously so much abused, and whose coal was declared by certain experts to be appreciably inferior to other coal, at a lower price, which was rejected. A reasonable inference is that the Committee have thrown their experts over. Alderman Riley, who has smarted under the accusations made against the administration of the gas-works during his chairmanship, is not unnaturally elated at the justification of the policy of the old Committee which the new Gas Committee's proceedings afford. His ironical references to the opinion of the two eminent experts, and his amendment, which he hoped no one would be foolish enough to second, are almost the only humorous touches in all this gloomy business.

THE GAS ADMINISTRATION OF MANCHESTER.

GAS matters were discussed at the meeting of the Manchester City Council last Wednesday, when Alderman W. Smith proposed that the practice pursued by the Gas Committee for many years, of charging depreciation against the profit and loss account of the gas undertaking, should be discontinued, and that instead the profit and loss account for the current year should be charged only with the actual expenditure for maintenance and repairs. The motion was seconded by Mr.

J. W. Southern, and opposed by Alderman Sir John Harwood and others, including Alderman Lamb, who in the course of his remarks asserted that "the consumers ought to be grate-"ful for what had been done for them by the Corporation" —thus fulfilling our prophecy of last week. The proposal was lost by a vote of 29 to 23—a tolerably satisfactory division for the reformers, who may be reasonably certain of ultimate success if they only keep working steadfastly on the same lines. The debate was not of a very instructive character, the advocates of the policy of the Gas Committee being too apt to snub all those who differed from them, instead of fairly arguing the matter on its merits. Those who did not adopt this tone of lofty superiority went to the other extreme, and professed nervous anxiety for the future of gas lighting in view of electricity, water gas, cheap oil, and what not; altogether forgetting that to be logical they ought to decline spending another penny on the works, and get rid of the responsibility of them as quickly as possible. It is a melancholy outlook for the gas consumers of the Manchester district, between the high-and-mightiness of some of the old gas-works administrators and the despondency of others. No commercial undertaking ever came to any good when governed in this way. Perusal of the report of the debate suggests the reflection that the Committee, more than the works, want an allowance for "depreciation." There is nothing progressive, liberal, energetic, or hopeful in them. To make money is the best they can do; forgetful of the fact that the most foolish of gas directors can do this under the British statutory system of gas supply. It is sad to think what the present condition of gas engineering would have been in this country if all Boards of Directors and committees had been of the mind of the Manchester Corporation Gas Committee. Alderman Lamb thinks that the local public have reason to be thankful, as gas consumers, to the Corporation; but they would have had much more occasion for gratitude if the Corporation had had nothing at all to do with the gas supply except see that a Company supplied better gas than they can. Under the sliding scale, or without it, a Company would have sold better gas in Manchester at a greatly reduced price as compared with the Corporation, would have earned good dividends, and would at the present time be in a position to face the future with more confidence than the majority of the Aldermen of the City can muster between them.

GAS-METERS FOR USERS OF ELECTRIC LAMPS.

An interesting piece of news connected with the rivalry between gas and electricity in the United States comes to us from New Orleans. It appears that the New Orleans Gas Company do not charge meter-rent to their regular consumers; but in view of the fact that some consumers who have taken to electric lighting made a convenience of the gas supply—using it merely as a stop-gap when the electric lamps broke down, or when more light was wanted than the Electric Company could afford—the Gas Company gave formal notice to this class of consumers of their intention to replace all meters not fully utilized with meters commensurate with the average quantity of gas consumed. Consumers who wished to keep large meters for a stand-by were expected to pay rent for them when the gas consumption did not reach a stated figure. This decision of the Gas Company seems perfectly reasonable; but one of their consumers thought otherwise, and obtained a preliminary injunction restraining the Company from removing the old meter, which was large enough to pass gas sufficient for lighting the whole premises, and substituting for it another of size proportionate to the average consumption. The point at issue was clearly one of great importance to suppliers and consumers both of gas and of electricity for lighting purposes, seeing that it involved the whole question of dispensing with gas as a prop for the electric light. The matter was tried in the Civil Court of the District, and judgment has just been delivered dissolving the injunction and deciding the case in favour of the defendants. Besides the importance of this victory to the New Orleans Gas Company, it establishes a valuable precedent. Of course, the question would not arise where a consumer wishing to indulge in electric lighting is willing, for the sake of security, to keep a gas-meter of his own, or hired from the Gas Company, as large as may be required for the lighting of the whole premises. The most striking point brought out by this judgment is corollary to the main issue, and is expressed in the remark of the Judge that "while the "defendants are bound to furnish gas, their obligation is "limited to supplying gas to customers—to those who use it "regularly, and who use it through adequate meters." It follows from this statement that a Gas Company in the United States would not be liable for damages through a failure of the supply due to a sudden and unexpected drain for making good a breakdown of electric lighting. It is a striking case; and the result will not tend to make the way of the competing electrician easier. A similar point had already been decided at Cincinnati; but this did not affect the Louisiana case. It is satisfactory also to learn that the common sense of the community approves of the legal dictum.

DEFEAT OF THE BIRMINGHAM GAS-FITTINGS AGITATION.

The question of Corporation trading in gas-fittings has been debated in the Birmingham City Council, upon the report of the Gas Committee, the substance of which we gave last week. As already stated, an organized attack has been made upon the Birmingham Gas Committee by their opponents of all shades, who this time utilized the claims of the gas-fitters against the Department, just as they have on previous occasions used other openings. In the result, the policy of the Committee has been supported by a vote of 29 to 24, which was not such a large majority as the Committee would have wished. We are not at all concerned in the politics of the town, and cannot point out how much of this opposition movement is genuine and how much is due to party feeling. One thing we may at least notice, and that is the persistency with which the so-styled "labour representatives" on the Council press everything which they hope may afflict the gas administration, regardless of the interests of the ratepayers. Well might one of the Town Councillors declare that he was "sick of hearing about "these trades unions," which in Birmingham try to rule everything in their own way. Upon the general question of the supply of gas-fittings by gas manufacturers, we have already declared our opinion to be that it is a good thing for the public—perhaps better for the community than in a strict monetary sense for the gas suppliers. The control of internal fittings should never have been wrenched from the supply of gas, out of which initial mistake much mischief has arisen. Electric lighting companies everywhere will supply interior wiring, not as monopolists but for the guidance and convenience of their customers; and gas manufacturers have quite as clear a right to do the same. If they had done so everywhere and from the first, it would have been better for the public in every respect. We look upon this Birmingham gas-fitters' agitation as largely factitious and deserving of some more severe treatment than it received at the hands of the majority of the Council.

LIGHTNING CONDUCTORS AND GAS-PIPES.

The present season in England seems to be distinguished by much electrical disturbance not only industrially but also meteorologically. Thunderstorms of a more or less violent character are marking at frequent intervals the early setting-in of hot weather. There is special interest therefore in the discussion of the perennial question of the protection of buildings from lightning, recently revived in an authoritative fashion by Dr. Lodge. The great modern extension of the employment of masses of metal in interiors in the form of gas and water pipes, to say nothing of telegraph and telephone connections, naturally exercises the minds of house builders and occupiers, who are pardonably curious as to the effects of such additions to structures exposed to lightning. This curiosity is by no means allayed by the disagreement existing among professors of electrical science respecting the most efficient means of providing for lightning discharges. It is recognized that the old idea, which held a building to be fully protected by a conductor carried above the highest point and connected with damp earth, is not wholly tenable; for lightning is known to have played many vagaries with structures apparently furnished with a copper-rod conductor of the most approved and expensive pattern. It appears to be settled that the area of protection by a single rod of the ordinary description may be very limited, and that something like a cage of iron wire carried over all gables, and grounded at several points, is necessary for a large building. With regard to the influence of gas-pipes in a building, it is also tolerably well proved that while damage has been caused by not metallically connecting them with lightning rods, no instance of disaster arising out of such connection, when properly made, has been recorded—always provided, of course, that the earth contact of the conductor is good. It seems to be dangerous to depend entirely upon underground gas or water pipes for earthing conductors, as is sometimes done; for unless the soil surrounding such pipes is permanently damp,

they will simply act as conductors for a long way, or until the proper "damp earth" is met with. In any case where the architect of a building proposes to connect his lightning rods to the gas-mains, therefore, it will be advisable to insist first upon the conductor being efficiently grounded in a load of coke buried at a depth where the soil may be expected to remain always damp, and then the gas or water service pipe may be placed in metallic connection with it.

Water and Sanitary Affairs.

The recent fearful disaster in the Conemaugh Valley, in Pennsylvania, naturally calls attention to the state of security with respect to reservoirs in general. The present catastrophe is not connected with the supply of water to towns, but arises from the yielding of a monster dam stretching across a valley, and holding back a volume of water constituting a pleasure lake. Still the conditions are practically those which relate to all reservoirs formed at the head of a valley. England is not without instances of fatal inundations occasioned by the failure of reservoir embankments, as in the case of the Holmfirth flood, when more than 90 persons perished; and the bursting of the Bradfield reservoir above Sheffield, when 250 lives were lost. The safety of the great Vyrnwy reservoir is a matter on which assurance is scarcely needed; the admirable character of this gigantic work being well known. Sir Robert Rawlinson, writing to *The Times*, speaks of this huge basin as "having a rock site and stone-"wall embankment which will be safe for all time." But Sir Robert pleads that in future all reservoirs must be embanked with stone walls instead of earthwork. Referring to the Huddersfield and Sheffield disasters, Sir R. Rawlinson goes on to say: "We are not without other large "embankments of earth which require careful watching." If so, we trust that due care will be exercised. On the whole a degree of caution is observed in this country which seems to be wanting in America. It is said of the Conemaugh dam that it was sending out jets of water 30 feet long some three days before the flood burst forth. The embankment had long been viewed with suspicion, and down to the last moment the people were warned of their peril. But few took heed; and thousands perished. A discussion has taken place as to whether the dam was properly constructed. Probably it was not; but more precise information is required on the subject. Even if built of masonry, as appears to have been the case, a proper foundation would be needed to prevent settlement and cracks. It is to be hoped that this terrible affair will be taken as a general admonition, so as to secure the requisite guarantees that engineering work shall not result in sending an artificial deluge sweeping down a populated valley. The fate of Johnstown, with its strange combination of flood and fire, will be put on record as one of the most heartrending incidents of modern times, taking rank with earthquakes and volcanic visitations.

The litigation between the Bristol Water-Works Company and the Corporation of the city has terminated in a manner which goes a good way to justify the comments we made on the judgment pronounced in the Queen's Bench Division when the case came before Baron Huddleston and Mr. Justice Wills; although, unfortunately, the change now effected is of no immediate advantage to the Company. On the former occasion, the Judges proceeded to decide whether or not the quays of Bristol were "streets" within the meaning of the Act, so as to entitle the Company to the cost of the removal of their pipes owing to the action of the Corporation. It was then decided that the quays were not streets; and judgment was given for the defendants, with costs. We then remarked that the Corporation had "gained the day "by a quibble," and that if an appeal followed, a different judgment would perhaps be given. On the definition of a "street," as required by the Act, the judgment now pronounced (of which a full report will be found in our columns), certainly differs from that given in the Court below; the Lord Chief Justice considering the view then propounded to have been "too technical." So also Lord Justice Lindley says the Court is driven to the conclusion that the word "street," in a certain section of the Special Act, includes a wharf, which is a public place. As it happens, this does not help the Company so far as the present case is concerned. Had the Corporation altered "the level, direction, "or situation" of the quay or wharf, then the Company would be entitled to recover the cost of relaying the mains. But the Corporation have erected a shed or building over the mains of the Water Company, and though the latter have in consequence had to remove and relay their pipes, it is decided that they cannot recover the cost of so doing. The reasoning is, that the Company are bound to lay their pipes at spots which are "convenient" for supplying water to the masters of the ships lying alongside the quay—hydrants being employed for the purpose. A building being erected over a spot previously convenient renders that spot henceforth inconvenient; and the Company must bear the cost of removal, so that a convenient spot shall be found. Further, the Company are not entitled to an injunction to prevent the Corporation from erecting or maintaining a building over their line of pipes. It might be said that erecting certain sheds which made the removal of the pipes necessary, was an alteration in the direction of a street. As a wharf in this case is a "street," it would seem as if this was a very good contention. But the Judges rule otherwise; and it is held that, under the circumstances, there is no statutory liability upon the Corporation to pay compensation for the removal of the mains or pipes. The Water Company are to have the costs in the Court below, but not those of the appeal. Such are the eccentricities of the law. As if the erection of a building over a line of pipes in a "street" was not a change in the "situation." On the whole, we are rather at a loss to know which of the two judgments is the most "technical."

An interesting case as to the right to divert subterranean water has just been settled by Mr. Justice Denman in the Queen's Bench Division. The action was designated as that of *Bower v. Sandford;* but the rights of several parties as against the defendant were involved in the suit. Jonathan, John, and William Bower all claimed an injunction to restrain the defendant from permitting a certain drift—that is to say, an underground artificial conduit or tunnel for water—to carry off the water from a certain spring, so as to deprive the plaintiffs or any of them of the use of the water in question. A right of way to the spring was also claimed, and damages. The action came on to be tried at the Leeds Assizes in March last; but it was referred to an Arbitrator to state the facts. After the Arbitrator had made his report, the case was argued before Mr. Justice Denman for two days. The merits of the case were mainly governed by the conditions on which the defendant had purchased certain land connected with the hamlet of Cross. Those conditions were that the conveyance was made subject to the rights, if any, of the owners and occupiers for the time being of the estate at Cross, and the rights, if any, of the inhabitants to fetch water from the spring now in dispute. Despite these conditions, the defendant intercepted the underground flow, and carried off the water from the spring (along the driftway, and by means of pipes) so as to supply his own house and mill. A mill belonging to one of the plaintiffs was thus deprived of water which it would otherwise have received from the spring, the total flow from which was reckoned at 20,000 gallons in the twenty-four hours. The Judge considered that the defendant must have "purposely "and knowingly" tapped water which would otherwise have reached the spring. Accordingly an injunction was granted, with damages 40s., and costs. The geological facts investigated by the Arbitrator were a little complicated; and it required some skill to trace the exact course of the water, so as to fasten the responsibility on the defendant. The case proves, at least, that underground water may be made the subject of an agreement such as cannot be violated with impunity. The operation may be indirect; but if the spring at the outcrop is to be preserved, it is plain that the underground supply must not be intercepted.

The Largest Gasholder in Europe.—We understand that the Imperial Continental Gas Association are about to construct at one of their stations in Vienna a gasholder which will exceed in capacity any holder so far erected on the Continent. It will consist of three lifts; the diameter of the exterior one being 204 feet, and each of them 41 ft. 4 in. deep. The holder has been designed by Mr. Corbet Woodall, and the contract for its erection has been entrusted to Messrs. Samuel Cutler and Sons, of Millwall, London. This firm have also in hand other works of large dimensions—notably a three-lift holder, 197 feet in diameter and 50 feet deep each lift, now in course of erection at the Bethnal Green station of The Gas-light and Coke Company, according to the designs of the Chief Engineer, Mr. G. C. Trewby. Messrs. Cutler are also erecting at the present time for the South Metropolitan Gas-Works, at East Greenwich, what are believed to be the largest purifiers in the world. They have been designed by Mr. Frank Livesey and are six in number, 90 feet long by 30 feet wide each box, with covers also in one.

Essays, Commentaries, and Reviews.

THE AFFAIRS OF THE GAS INSTITUTE.

The following remonstrance against the declared intention of the Council of The Gas Institute to award the Birmingham Medal has been forwarded to Mr. W. Longworth, Hon. Sec. *pro tem.* It bears the signatures of 39 of the subscribers to the fund raised for founding the medal, which is a very large majority of the 55 or 56 remaining available for an expression of opinion respecting the destination of their benefactions. Having so recently declared our opinion of the unseemliness of the proposal to bestow this whilom distinction by the agreement of the small group of members of Council who have taken the matter in hand, we shall add nothing at present to the terms of this protest, except to remark that anyone who would consent to receive the medal under existing conditions would display little regard for his own dignity.

To the President and Council of The Gas Institute.

We, the undersigned subscribers to, and promoters of the Birmingham Medal Fund in 1881, desire to direct your attention to the alteration which has taken place in the circumstances under which the fund was placed at the disposal of the Council of The Gas Institute.

At the period of the formation of the fund, The Gas Institute was fully representative of the gas industry; for it comprised nearly the whole of the gas engineers and managers engaged within the United Kingdom, the colonies and dependencies. Recently, however, a considerable number of prominent members have felt themselves impelled to retire from it; and it has thereby to a great extent lost its representative character.

We therefore suggest to the Council the desirability of either postponing for the present any further award of the medal, or transferring the administration of the fund to some other scientific body, such as the Institution of Civil Engineers.

[Here follows list of names.]

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1100.)

Business on the Stock Exchange was sadly interfered with during last week. What with Jewish Holy-Days and Epsom Races—pious Hebrew rites and Christian Saturnalia—the number of those who had an eye to profits in Capel Court was limited indeed. Prices consequently ruled rather dull; but there was no considerable fall. The Foreign Market was about the weakest. The Money Market remains without change. The Gas department has been very fairly active, considering all things; and it was pretty steady in general. There are several variations in the quotations; but they are extremely slight in degree, and rather irregular in their direction. In Gaslight issues, the "A" opened rather weak on Monday—marking 256; and the next day the quotation fell 1, though actual transactions commanded rather better figures. It fell rather dull again on Wednesday; but on Friday it more than recovered its loss, and closed at 260—the best of the week. Several of the secured and limited issues have been dealt in at moderate prices. South Metropolitans have been very quiet; and the "B" receded 1. But the debenture stock was in demand, and advanced to a similar extent. Nothing has been done in Commercials except one transaction in the new, at 216, after the quotation had been lowered 1. This is a favourite stock, however, and is not likely to go begging. Suburbans and Provincials are quite stagnant, without a mark all the week. Among the Foreigners, Imperial Continental has been firm and active, and the quotation is a point better. All others have been quiet, and some dull; Bombay and Oriental losing the advance they had gained the week before. The Water Companies have shown more activity, coupled with general strength. The Chelsea Company will meet on Thursday to declare a dividend better than the last by ½ per cent., which explains the rise in the stock during the last week or two. The changes in quotation are a rise of 2 in New River and in Chelsea; and of 1 in East London and in Lambeth 7½ per cents. Southwark, as might be expected, is 1½ lower.

The daily operations were: Moderate business in Gas on Monday; but figures were rather below the average, and all changes were downward. Commercial new fell 1; and Bombay and Oriental, ½ each. No business was done in Water. Tuesday's Gas business was mostly in Gaslight "A," which fell 1; and in Imperial Continental, which rose 1. In Water, the only feature was an advance of 1 in East London. Gas business on Wednesday was wholly in Gaslight and Imperial Continental, at existing prices. Chicago second bonds rose 1; but South Metropolitan "B" receded 1. Water was a little more brisk; and Chelsea and New River improved 2 each. Thursday was a very quiet day in Gas, and nothing moved either way. In Water, Lambeth was repeatedly dealt in, and West Middlesex also came in for notice, but quotations did not vary. Friday's Gas business would have been next to nothing but for Gaslight "A," which was in much better demand, and rose 1½. South Metropolitan debentures improved 1. Water was not remarkable. On Saturday some good prices were obtained in Gas, especially Imperial Continental and South Metropolitan debentures. All quotations were steady. Water was not touched at all; but Lambeth 7½ per cents. were 1 higher, and Southwark ordinary was 1 lower.

It is reported that the Board of Trade have refused the application for a Licence made by the Brighton and Hove Electric Lighting Company.

ELECTRIC LIGHTING MEMORANDA.

THE LONDON COUNTY COUNCIL AND ELECTRIC LIGHTING COMPANIES—M. GASTON PLANTE—AN ALTERNATING CURRENT MOTOR.

The London County Council have considered Major Marindin's report on the electric lighting question, and do not seem to have found much in it to complain of. They have, however, expressed the desire to be recognized as the authority over electric lighting schemes affecting the Metropolis. But this is the position assigned by the Act to the Board of Trade; and there is no immediate prospect of their ambition in this respect being fully gratified, although it is natural to suppose that their position will be recognized in the future stages of the procedure by which the London electric light companies will be endowed with statutory powers. The Council will have an indisputable *locus standi* in connection with any inquiries that may be instituted by the Board of Trade for settling the financial responsibilities of companies allotted to various London districts. In regard to electric lighting, however, as in connection with other matters, the County Council have a great longing for legislative as well as executive powers, which require to be granted, if at all, with much circumspection. Although the Council occupy a special position among similar bodies, by virtue of the great importance of the locality which they represent, they are after all among the youngest and least experienced of local administrative organizations, and have all their reputation to make. It appears to us that the electric lighting interest of London would have as much reason to object to being left wholly at their mercy as any other traders have to being subjected without the power of appeal to municipal corporations in different parts of the country. If the London County Council is to succeed to the legislative powers of Parliament in matters affecting lighting, it is difficult to see where the line can be drawn.

The French scientific journals are devoting much space to notices of the career of M. Gaston Planté, the inventor of practical secondary batteries for use in the so-called storeage of electricity, whose death we recorded last week. M. Planté was certainly one of the lights of contemporary French science. He occupied a place apart from other men of science, being fortunate in the possession of an independence which relieved him from the necessity of working with any particular clique in the scientific or political world. It was in 1860, after patient experimenting with secondary currents, that M. Planté constructed his first secondary battery, or accumulator, which created a remarkable sensation in the Academy. Although accumulators have since been modified in many ways, it is declared that this class of appliances can no more be severed from the name of Planté than can the injector from that of its first inventor, Giffard. In his own laboratory, Planté made an immense battery of accumulators, which he charged slowly by means of two Bunsen cells, and which enabled him to obtain imposing electrical manifestations, including artificial reproductions of natural phenomena, such as the aurora and globular lighting. He continued working up to his death, and recorded his experiences in his book *Recherches sur l'Electricité*, which M. Tissandier declares in *La Nature* to be one of the greatest monuments yet erected to electrical science. He was a man of wide culture, and as retiring as he was eminent. He sought no distinctions for himself, and was never enrolled among the list of the Academy, which is the ambition of most scientific Frenchmen.

During the past few days, it has been announced that something hitherto regarded as practically impossible in electrical science—the utilization of alternating currents for the transmission of motive power—has been accomplished. An account of this fresh advance is published in *Engineering*, although the first announcements were made by Mr. W. M. Mordey at a recent meeting of the Institution of Electrical Engineers. Even so lately as Major Marindin's inquiry, it was argued as a drawback to the distribution of electricity by alternating currents that these were unavailable for driving motors; and the importance of the new departure, if confirmed by experience, will be measured by the weight that was undoubtedly ascribed to this objection. Mr. Mordey declared at the Institution named that alternating current machines could be employed as motors, and would give an efficiency of 90 per cent. He invited the Council to be present the next morning at the works of the Brush Corporation to see two 50-horse power machines of his own design tested in practical working. Here accordingly each machine was seen driven by a 75-horse power Fowler engine, and when at full speed they were switched parallel, running perfectly. After several tests to show the two machines running in parallel, one was disconnected from the engine and continued to run as a motor synchronously. The only point in opposition to the success of this proceeding is that "an alternate current motor cannot be relied upon to start from rest; it must be put into rotation by an external force, and brought to approximately the same rate as the generator." This cannot be done by hand unless the machine is small; but Mr. Mordey has devised a ready means of attaining the end, at a small cost, by the intermediary of a secondary battery. This demonstration is regarded as marking an epoch in electrical work, since it removes one of the objections to the alternating current. If now some means of storing this variety of current can be found, it will rank as equal in all respects to the more costly direct current.

The Honiton gas-works have been leased to Mr. T. B. Purnell, of Exeter, and placed under the management of his son Mr. E. H. Purnell, who gained his first experience under Mr. Crowe, of Wellington, afterwards with Mr. Stevenson, at Colchester, and lately with Mr. F. W. Stevenson, at Sheffield. Mr. Purnell also has charge of the Government Gas-Works at Yorktown, Surrey.

VENTILATION AT THE SOCIETY OF ARTS.

THE subject of ventilation as applied to the interior of buildings has been brought before the Society of Arts by Mr. D. G. Hoey, who is a professor of the art with strong views respecting the superiority of his own system. This natural predilection did not prevent him from introducing his matter with an interesting recapitulation of past and present ventilation methods. The first deliberate attempt to ventilate a building in this country was assigned by the author to Sir Christopher Wren, who in 1660 undertook this service for the House of Commons. His plan consisted of making four large holes, one in each corner of the ceiling, placing over each a truncated pyramid carried up 8 feet into the room above, with valves in the truncated funnels for opening and closing them. He calculated that "the breath of the people below, and the steam of the candles, would pass upwards from the House through these funnels" into the upper chamber. This was the first appearance of the foul-air chamber, which has since been so frequently used in ventilation systems, and never to any good effect. There was no artificial means of creating an upward draught in this early plan of Sir Christopher Wren's, nor was there any special provision for the admission of fresh air. Consequently this duty was left, as it so often is to this day, to imperfectly fitting doors and windows; and it is not surprising therefore that the action of the exhaust funnels was frequently the reverse of what was intended, and that sometimes when the valves were opened, the current, instead of going upward and thus carrying off the used and vitiated air, turned downwards, causing showers of cold air, much of which was impure, to descend upon the heads of those who sat beneath. Nearly a century later, in 1736, Dr. Desaguliers attempted to remedy the most obvious of the defects of the old system of ventilating the House by setting up an exhaust fan for drawing off the vitiated air; but this plan was a failure. Notwithstanding this early testimony of its inefficiency, the exhaust-fan system has been tried in hundreds of instances down to the present day. In 1784 Mr. Whitehurst, of Derby, attempted to ventilate St. Thomas's Hospital, London, by cutting away an inch and a half of each pane of glass in the bottom row of the upper sash of every second window, and setting an angle-piece of glass across the window at a little distance from it. This appears to have been the first example of the angle flap-valve system of admitting fresh air into rooms; and as there was no provision for getting rid of the foul air, it probably did not yield the benefits expected by the designer. In 1811 Sir Humphry Davy set up, and put into operation, the most notable of all the schemes essayed from time to time for the effective ventilation of the House of Commons. He admitted the fresh air through numerous apertures in the floor of the House, and carried off the foul air by tubes in the ceiling heated to promote rapidity of upward discharge. Mr. Hoey declares that notwithstanding its unfortunate and calamitous failure, due to the then nebulous condition of knowledge in regard to applied mechanics and of the law of atmospheric diffusion, Sir Humphry Davy's plan was a creation of genius and the first embodiment of the fundamental principles on which alone the effective renewal of the atmosphere of rooms can be accomplished. After the failure of this plan through the defective mechanical appliances relied upon to carry it out, many other systems were tried, but failed on account of being unsound in principle as well as defective in action. Mr. Hoey stated that there was recently in Glasgow a repetition of this same plan with the same failure in effective action, arising from the like mechanical defects. He says: "When I inspected and reported on the condition of the ventilation of the Corporation Gas Office, I found that the gratings fitted into the numerous apertures in the floor for the admission of fresh air had been nearly all carefully covered over by nicely fitted squares of waxcloth, because the occupants had found the draughts occasioned by the passage of the air upwards unbearable; and the upright outlet tube rising from the ceiling, although of very considerable height and sectional area, was found to be throttled, both at its entrance and exit, in a very ingenious manner, whilst in several parts it was not perpendicular but horizontal, with abrupt bends and other serious defects, so that it was rendered incapable of taking off a fraction of the vitiated air that would otherwise have escaped through it."

The next scheme mentioned by Mr. Hoey was that of Mr. (afterwards Sir Charles) Barry, which was brought forward in 1847 for the ventilation of the Parliament buildings, and failed as badly as its predecessors. The author does not stay to mention any other authorities on the subject—an omission for which he was severely criticized in the discussion that followed the reading of the paper—but proceeded to state what he called the fundamental principles of the science of ventilation, as established by Sir Humphry Davy. The first proposition states that thorough ventilation consists chiefly in two operations, the intimate and invariable correlation of which must be kept always clearly in view. These are, first, the regular and constant carrying off of the air that has been fouled and heated, and the commensurate introduction of fresh pure air in its place. It appears as corollary to this proposition, that all methods which are limited to one or other of these two indispensable adjuncts are *ab initio* defective and devoid of title to the name of a scientific system. Also the apparatus for producing the double action must be capable of easy and immediate control, and of instant regulation to the degree of ventilation required under all circumstances, quite independently of wind or weather. Systems of exhaust which depend on the motion of the outer atmosphere are styled anachronisms by Mr. Hoey, because they are literally as variable and inconstant as the wind. His second proposition is that the fresh pure air must be introduced at a level low enough to mingle with the coolest and best air already in the room, and yield its oxygen uncontaminated for inhalation by the occupants. All irregular entrances for air, as by badly fitting or open doors and windows, should be closed. It follows that the air thus introduced should be imperceptibly diffused and free from sensible current, that entrance doors and windows should be double, and that means should be provided for cooling the air in summer and warming it in winter, also that fog and blacks should be shut out. The third proposition states that the most efficient means of carrying off the impure air is an upright shaft, containing a column of air rarefied by heat, communicating at its lower end with the room at or near the ceiling, where the heat and impurity are at their greatest, and at its upper end discharging freely into the atmosphere. The fourth proposition is that the interrelation and balancing of the two processes, of admitting fresh and removing exhausted air, must be kept clearly in view.

Having thus made profession of his principles, Mr. Hoey describes how he carries them out. For the admission of fresh air without currents or draughts, a dado—preferably about 3 feet in height, but which may be something higher or lower to suit particular circumstances—is fitted at conveniently available parts round the room, with a narrow space between the dado and the wall; and on the top of the dado wire gauze or perforated metal is fixed in an inclined position, so that articles may not be placed upon it to impede its action. The fresh air is introduced into the dado space, at a low level and in a lateral direction to promote diffusion, through a number of inlets from the outer atmosphere along the whole line. The total area of these inlets is proportioned to the area of the hot-air shaft, after mentioned, for carrying off the fouled air. The total space enclosed by the dado, forming a fresh air chamber or reservoir, being very much greater than the total area of the inlets from the outer atmosphere, this air loses its initial velocity in it, and gently and insensibly diffuses itself through the perforated gauze. Of course, if desired, arrangements may be made for warming, cooling, or purifying the air at its admission. For carrying off the foul air, the needful perpendicular column of highly rarefied air is best supplied by means of a chimney of suitable capacity with a close-throated fire-grate, or by a suitable connection with an existing perpendicular flue. There should be an opening in the room at a high level into an outlet tube communicating with the perpendicular column of rarefied air in the chimney or upright flue. When the heat of a fire is not available, the upcast pipe is to be kept warm by an atmospheric gas-flame; or vertical tubes from sun-burners or recuperative gas-lamps can be made available for this purpose.

Mr. Hoey narrates that his system was first applied in the Bungalow bar of the Glasgow International Exhibition, used for drinking and smoking. It was 50 feet long, 20 feet wide, and 11 feet high to the opening of the outlet ventilating tubes. It was lighted by three Wenham gas-lamps utilized for heating three outlet tubes 16½ feet in height and 7 inches diameter widened at the lower end, which was placed 10 inches above the top of the lamp chimneys. The fresh air was introduced by means of a dado the whole length of the bar, being 50 feet long, 3 feet high, and 6 inches deep, into which the air flowed through seven equidistant 9-inch holes in the wall. During very hot weather, trays containing ice and salt were placed in these openings. This particular application of the system was reported upon by Dr. Wallace, who found it effectual in changing the air of the apartment. In the case of another apartment ventilated by Mr. Hoey—the smoking-room of the Glasgow Liberal Club—the air of the room before he took it in hand was such that the members generally declined to use it. His dadoes were in this case two in number; and the outlet was into the chimney by a semi-circular bend. A Bunsen gas-burner was fitted at the back of the fire-grate, to keep up a draught in summer. The paper ended with a description of the ventilating arrangements of the London Stock Exchange and the Houses of Parliament.

Mr. Hoey's paper was severely criticized by the Chairman of the meeting, Sir Douglas Galton, K.C.B., &c., and others, on account of the author's assumption of all knowledge in the matter of ventilation, and his scant acknowledgment of the labours of others—such as Sylvester, Goldsworthy-Gurney, Tobin, and Dr. Percy—who have at least done something to elucidate the problem of ventilation. It appeared from what was said in the discussion that Mr. Hoey has not hit upon anything new, since the theatre of the Society of Arts has been ventilated for the past six years by a system applied by Mr. E. C. Robins, which is undistinguishable from that which he claims for his own. Apart, however, from the unpleasant pretension of Mr. Hoey to have come to London from Glasgow for the purpose of instructing an ignorant universe in the science of ventilation, the paper was useful enough. Mr. Hoey's plan is of what may be called the "natural" class—that is to say, it dispenses with mechanical aid to the changing of the air of an apartment. All the work is practically thrown upon the outlet shafts, which have to draw into the room all the air required, and yet not create a down-draft in the chimney. Now it is easy enough to ventilate a dwelling house in this way, when no unusual strain is thrown upon the arrangements; and a single apartment of a large building, such as a smoking or concert room, may be similarly treated. When it is considered, however, that not only must every shaft have a separate connection with the outer air, but also be kept hot by coal or gas heat, it becomes clear that the applicability of the system is limited.

There is absolutely nothing in Mr. Hoey's plan but a modification of the principle of the Tobin tube; and he pitches his claims for it altogether too high. The great difficulty of an exhaust ventilation arrangement is in balancing the pull of the air outlet with that of the open chimney when the fire is burning; and it is this, with the cost of a furnace draught when required on a large scale, that has led to the employment of pressure systems, whereby a *plenum* of air is maintained in any number of apartments either by a fan or by jets of compressed air. In this case there can be no draughts, because all leakage must be out of, instead of into the room; the chimney, if there is one, cannot smoke; and the air outlet must act in the intended way. This is an important consideration, because it is certain that halls and rooms of every kind are much sweeter if they possess numerous doors and windows that can be thrown wide open for the air to sweep freely through them when not occupied, than when these ordinary openings are hermetically closed and the "scientific" ventilation is alone available. The best system of ventilation by insensible air currents is after all only a last resort for mitigating the initial evil results of overcrowding a number of people in a confined space; and there is nothing like a "thorough draught" for removing stuffiness—the difficulty being, of course, that the remedy cannot conveniently be applied when it is really most wanted.

Modern Sanitary Work.—Sir Robert Rawlinson, K.C.B., delivered a lecture on the rise and progress of modern sanitary work at the University Museum, Oxford, last Wednesday. Sir Henry Acland presided; and, in introducing the lecturer, said Sir Robert was the first Sanitary Inspector under the Board of Health, which was formed over 40 years ago, and from that time to this, in civil and in military life, at home and abroad, he had been the centre of this kind of work for the Government, and was now the veteran in this important department in Europe. Sir Robert Rawlinson then gave an account of his experiences in sanitary work since 1848, when he first became Sanitary Inspector under the Board of Health.

Oxygen Purification at Ramsgate.—The purifier inspected by the Southern District Association of Gas Engineers and Managers at the Ramsgate Gas-Works, on the occasion of their recent meeting, was finally opened on Monday of last week in the presence of Mr. Henry Hack, M. Inst. C.E., of Birmingham, who went down to Ramsgate for the purpose. The purifier when tested showed that it was still active for sulphuretted hydrogen and carbonic acid; removing 50 grains of the former, and 0·25 per cent. of the latter. At this point, however, the gas was shut off, and the lid finally raised; it not being thought worth while to re-arrange the lime again after the inspection by Mr. Hack. The material was perfectly inodorous, excepting a slight smell of ammonia which may have arisen from the scrubber being out of action for a few hours some days previous. The second purifier, which is now No. 1, is still doing one-half the work of purification; and the inlet of the third purifier shows that there remains very little for it to do. The whole of the gas, therefore, made is purified practically in two boxes 14 feet square. Thus, with the boxes all clean, No. 1 has been in action 41 days, and passed over 9 million cubic feet of gas. It is thus clear that, in general working at the present time of year, and with the present make, a box will only require changing once in thirteen to fifteen days. The sulphur compounds have been maintained at the low point shown at the visit of the Southern District Association, and the illuminating power throughout has been at a minimum point of 16·5 candles, without the use of cannel.

Mr. W. Foulis on Water Gas.—With a view to removing some misapprehension which, he says, appears to exist in the report prepared by Mr. Foulis on the manufacture of water gas, a paragraph on which appeared in the Journal last week (p. 1039), Mr. Alfred Wilson, one of the Engineers of the British Water Gas Syndicate, has addressed a letter to a Glasgow contemporary, in which he says: "It is easily proved to any person who inspects the water-gas plant at work at the Leeds Forge that water gas is produced at a cost of less than 4d. per 1000 cubic feet; and this total consists of the following items:—

	d.
35,000 cub. ft. of water gas from 1 ton of coke at 7s. 6d. per ton equals per 1000 cub. ft.	2·71
Steam	0·09
Water	0·02
Labour	0·50
Interest and depreciation	0·40
Stores, &c.	0·19
Total	3·91

To use this valuable heating gas as an illuminant, the magnesia comb is used for producing a beautiful incandescent light. Mr. Foulis, however, enlarges on the depreciation of these combs, as they require renewing after about 100 hours of work. This point simply reduces itself to one of expense; and as the combs only cost 1½d. each, their up-keep is simply an addition of 3d. per 1000 cubic feet of gas burned when used for lighting purposes. We have therefore (say) 4d. for gas in the holder, and 3d. for the wear and tear of the magnesia combs—total, 7d. per 1000 cubic feet for what may be properly called 20-candle gas, and as such gas is incapable of condensation, and can be produced at any pressure and supplied through small mains, it has yet to be proved that it cannot be distributed through long mains and sold so as to yield a profit at a less price than 1s. 9d. per 1000 cubic feet, as mentioned in the report."

Notes.

The Loss of Heat by Unprotected Steam-Pipes.

Mr. Albert Haacke, of the Kieselguhr Company, has recently fitted up an apparatus for measuring the amount of heat lost by radiation and convection from steam-pipes and the like, and has communicated the results of some of his first experiments with it to *Engineering*, together with a description of the arrangement. The tests in question were directed to determine the relative losses of heat from (1) bare pipes; (2) pipes covered with 1 inch of fossil meal composition; and (3) pipes covered with 1 inch of fossil meal composition and three layers of hair felt. The testing surfaces are represented in Mr. Haacke's arrangement by three cast-iron steam-pipes of 5 inches internal diameter and 6 feet long with blank flanges on each end. These test-pipes are supplied with steam that has been dried, and are placed so as to be subject to radiation and convection under precisely similar conditions, one being bare, the other covered with fossil meal composition 1 inch thick, the third with 1 inch of composition and three layers of No. 3 felt, each ⅛ inch in thickness. The result of experiments with steam in the different pipes under pressures of from 45 to 60 lbs and upwards goes to show that a covering of fossil meal composition 1 inch thick saves out of a possible loss of 100 per cent. as much as 83·57 per cent.; and if over this covering 1½ inches of hair felt with canvas is added, the extra saving is only 8·25 per cent. If 1 lb. of steam coal is required to evaporate 8 lbs. of water into steam of 60 lbs. pressure, then 6½ cwt. of steam coal are required every year to make good the loss of heat from every square foot of uncovered steam-pipe. This loss is even greater in winter, or when the pipes are exposed to wind and rain, or where steam of high temperature is used. Finally, Mr. Haacke combats the opinion which is firmly established in the minds of many users of steam, that the outside temperature of a non-conducting composition applied to hot surfaces is a measure of its non-conducting efficiency. He considers this test of measuring the outside temperature, either by the hand or even by thermometer readings, as unreliable and misleading; and insists upon condensation experiments as the most reliable method of ascertaining the loss of heat by steam.

Wind Pressure and Velocity.

At the last meeting of the Royal Meteorological Society, Mr. W. H. Dines gave an account of some experiments made with the object of investigating the connection between the pressure and velocity of the wind. The pressure plates were placed at the end of the long arm of a whirling machine rotated by steam power. The results of experiments with twenty-five different kinds of pressure plates were given by the author. It appears from these tests that the pressure upon a plane area of fairly compact form is about 1½ lbs. per square foot for a velocity of 21 miles per hour; or, in other words, a wind travelling at the rate of a little more than 17 miles per hour will exert a pressure on a plane surface at right angles to its direction of 1 lb. per square foot. The pressure upon the same area is increased in this arrangement by increasing the perimeter. The pressure upon a ½-foot plate is proportionately less than that upon a plate of either half or double its size, which rather tends to make one doubtful of the value of the method employed. The pressure upon any surface is but slightly altered by a cone or rim projecting at the back, a cone seeming to cause a slight increase, but a rim having apparently no effect. After this statement, the suitability of experiments with whirling machines for elucidating the problems of natural wind pressure seems to be left an open question.

The Production of Carbonic Oxide by Moveable Stoves.

The question of the heating of living-rooms has been discussed at four consecutive sittings of the French Academy of Medicine, in connection with the moveable or slow combustion heating stoves which have become increasingly popular in Paris. Unfortunately, the number of fatalities traceable to the use of these stoves has increased at the same time that their use has become more general. M. Lancereaux opened the discussion in the Academy by relating typical cases of poisoning by the carbonic oxide gas which slow combustion stoves diffuse in the air of enclosed spaces warmed by them, and proposed to recommend to the competent authority certain prohibitive measures with a view to prevent a repetition of such accidents. M. Vallin objected to this proposal, as tending to bring the science of hygiene into disfavour, by making it condemn a popular appliance without indicating any other way of attaining the same end. M. Lancereaux demands, in effect, that the sale of no kind of stove should be authorized except on the guarantee that it has sufficient draught to convert all the carbon into carbonic acid, which is a purely theoretical requirement. Well ventilated chimneys make carbonic oxide, although they evacuate it outside the house. This reaction is produced whenever carbonic acid is passed over red-hot carbon. With a wood fire this action does not matter, because the combustible gas will always be converted into carbonic acid; but with stoves charged with coke, carbonic oxide has been found associated with carbonic acid in the flue in the proportion of 0·11 when the fire was burning clear, and of 0·34 when it had been freshly supplied with fuel. This was in a chimney with an open fireplace, and there is scarcely a modern stove with a closed flue that does not give products of combustion containing more carbonic oxide than open chimneys. To prohibit the use of stoves that yield carbonic oxide would therefore be to

war against the stove and coke industries. It was accordingly concluded by the Academy that it is better to instruct the public respecting the proper construction and use of coke stoves than to press for their prohibition by law.

The Appearance of Iron Fractures.

The ordinary method of judging of the quality of a piece of iron by the appearance of its fracture is often misleading. A practised eye may indeed, says the *Builders' Reporter and Engineering Times*, discriminate between coarse and fine metal by examining the broken ends of a bar. Nevertheless, little dependence is to be placed upon the supposed difference between iron which shows a "fibrous" and that which exhibits a "crystalline" fracture. The same break will not infrequently show patches of each appearance, and this in instances where it is perfectly certain that the texture is uniform. Probably in such cases the difference does not lie so much in the iron itself as in the manner in which it is broken. Where, for example, the fracture is of the nature of a cross-break, the piece will have a crystalline appearance; but when it runs along the grain, like a tear, the metal will look fibrous. In other words, the so-called crystals appear to be merely the ends of fibres which when drawn out into points would have presented a "fibrous" fracture. And, in general, the causes producing the one sort of break or the other seem to be external rather than structural. For instance, where a piece of iron is broken suddenly, as by a blow, or is nicked and then bent cold, the resulting fracture is nearly always crystalline; but when it is pulled steadily until rupture takes place, or is bent without nicking, the break generally presents a fibrous appearance. In this respect, indeed, iron behaves much like pitch and other ductile substances, which when drawn out slowly will run to a point, or break like a bunch of fibres; but if struck or jerked suddenly will crack with a smooth conchoidal fracture, corresponding to one of the crystalline faces of the broken metal.

Communicated Article.

THE CHEMISTRY OF ILLUMINATING GAS.

By Norton H. Humphrys, Assoc. M. Inst. C.E., F.C.S.

XX.

Anderson prepared methane* by heating 10½ parts of dry sodic acetate, 3 of caustic lime, and 2 of potassium hydrate, preferably in an earthenware retort. The gas was purified by washing first with potassa solution and subsequently with water. It could not be consumed in the standard burner, at the rate of more than 3 feet per hour. It gave a decidedly yellow flame, having a value equivalent to 12 sperm candles. This represents 4 candles per cubic foot, or 20 candles for 5 cubic feet; and such a high result rendered the author doubtful as to whether he had succeeded in securing pure methane. That these doubts were well founded appears to be the case from the results obtained by Mr. Lewis T. Wright,† who prepared pure methane according to a method described by Messrs. Gladstone and Tribe,‡ which consists in bringing methyl iodide together with water or alcohol into contact with zinc that has been coated with copper by electrolysis. The gas was very carefully purified by washing with alcohol, to remove vapours of methyl iodide, and finally with sulphuric acid to take up traces of alcohol. This gas was carefully tested in an ordinary photometer with all the usual precautions; the only addition being an adjustable cap to the top of the chimney of the Argand burner, so as to enable the air supply to be delicately adjusted until the best possible result was obtained. Under these conditions two experiments were tried, using in one case 2·78 cubic feet of methane per hour, and in the other, 4·46 cubic feet. The results calculated to a consumption of 5 cubic feet per hour were practically identical, being 5·2 candles in the first case, and 5·15 in the second. Dr. Percy Frankland, in the course of a paper on the composition and illuminating power of coal gas,§ said that pure methane had an illuminating value of several candles when burnt in the standard Argand burner; and gave but little light in a fishtail burner. Unfortunately he does not appear to have accurately tested the value of this gas.

These results are sufficient to show that methane possesses some value as an illuminant, and may therefore be classed with the hydrocarbons, rather than with the diluents. Anderson's experiments, which go to show that a mixture of marsh gas, hydrogen, and carbonic oxide possesses no illuminating value, can scarcely be taken as conclusive of the fact that the value of methane is practically *nil*. If we choose to reduce or neutralize the value of an illuminant by diluents, combustible or otherwise, that is no valid objection against the illuminant itself; indeed, on similar lines it could be proved that many other hydrocarbons are of no value whatever.

Dr. Percy Frankland has also directed his attention to the illuminating value of other members of the paraffin series—viz., ethane and propane. Full particulars as to the means adopted for the preparation of these gases, &c., are given in a paper read before the Chemical Society.‖ In no case, however, did he succeed in preparing a perfectly pure gas. The gas experimented upon as "ethane," contained 98 per cent. of that compound, the remainder consisting of nitrogen, oxygen, and carbonic oxide. The 2 per cent. of these incombustible diluents would be sufficient to have an important influence on the results obtained, and would, of course, reduce them. The ethane was burnt in a standard Argand burner at the rate of about 2 cubic feet per hour, and gave somewhat widely differing results, the average of which showed a value of 35 candles per 5 cubic feet of gas per hour. In the preparation of propane Dr. Frankland was still more unfortunate, as he only obtained a gas containing 95 per cent. of propane, the remainder being chiefly oxygen and nitrogen. The results obtained with this mixture cannot be considered as doing justice to the pure compound. This gas was burnt at something less than 2 cubic feet per hour; and the result shows a value of about 54 candles for 5 cubic feet per hour. The similarity in proportion between the values obtained for ethane and propane respectively—*i.e.*, 35 and 54 candles—and that existing between the atomic density of the carbon present in them, is pointed out by Dr. Frankland. Ethane contains 2 atoms, and propane 3 of carbon per molecule; and according to the above results, each atom of carbon would represent an illuminating value of about 17 candles. But according to the results obtained by both Dr. Frankland and Mr. Wright, methane is a marked exception to this rule, and no explanation is forthcoming as to why this should be the case.

We pass on to ethylene, which has attracted more attention than the other hydrocarbons. Anderson prepared it by cautiously heating a mixture of 2 parts (by measure) of sulphuric acid, and 1 part of alcohol.* The gas evolved was well washed by being passed through a series of four vessels; the first two charged with potash solution, and the others with dilute alcohol. It was not possible to burn more than 2 cubic feet per hour of this gas through the ordinary parliamentary Argand burner, having a 7-inch chimney, without producing smoke. The value of the light thus obtained was 17 candles, which by simple proportion would give a value of 8½ candles per cubic foot, or 42·5 candles for 5 cubic feet. Every precaution proper to photometrical experiments seems to have been observed. The valuable researches of Dr. Percy Frankland, as related in a paper contributed to the Chemical Society in 1883,† go to show a much higher value for ethylene than that above arrived at. The sample of gas experimented on consisted of 97·5 per cent. ethylene, the remainder being nitrogen and oxygen. As in the case of gases previously mentioned, these incombustible diluents were present in sufficient proportion to prejudice the results. When burnt in the parliamentary Argand burner, at rates varying from 1·96 to 2·44 cubic feet per hour, the lighting value ranged from 27 to 37 candles, and the average of four experiments gave a result of 68·5 candles for 5 cubic feet of gas per hour. Dr. Frankland also extended his researches to mixtures of ethylene with carbonic oxide, hydrogen, and marsh gas; and full particulars of the means adopted for generating these gases as pure as possible are included in the paper.

Mixtures of hydrogen with ethylene showed a regular diminution in illuminating power from 68·5 candles to zero, as the quantity of hydrogen is increased. The latter result was obtained with 90 per cent. hydrogen and 10 of ethylene. It is remarkable that a non-luminous gas should be obtained when as much as 10 per cent. of ethylene is present; and this point goes to explain the results arrived at by Professor Anderson, as already noticed. When the mixtures are calculated out to a uniform consumption of ethylene per hour, a notable result is arrived at. The value obtained from it is improved by the addition of hydrogen, until about 70 parts hydrogen to 30 of ethylene is reached. Five cubic feet of ethylene by itself, as we have seen, are worth 68·5 candles; but if mixed with 10 or 11 cubic feet of hydrogen, the light is 80 candles. After this point the light rapidly falls away, until the non-luminous mixture of 9 parts hydrogen to 1 of ethylene is obtained. It is difficult to see how the addition of a non-luminant should actually *improve* a gas. The most reasonable explanation is that the burner was better suited for the combustion of dilute, than of pure ethylene; or in other words, that it failed to develop the full value of the richer mixtures. It is interesting to notice that the rapid diminution is commenced when the proportion of hydrogen to carbon in the mixture i equivalent to that of methane. In the experiments with mixture of carbonic oxide and ethylene, it was found that so long as the former remained under 60 per cent. of the whole bulk, the illuminating value was only slightly less than that shown by a corresponding percentage of hydrogen; above this point a rapid falling off takes place, until the non-luminous point is reached at 20 per cent. of ethylene to 80 of carbonic oxide. It therefore follows that the intrinsic value of the ethylene is not reduced until the limit of 60 : 40 is reached; but after this it rapidly fails. The mixtures rich in carbonic oxide are somewhat prejudiced by its high specific gravity, which does not admit of the combustion of more than about 5 cubic feet per hour. The mixtures of ethylene and marsh gas follow nearly the same lines as the others so long as the limit of equal proportions is not exceeded, but beyond this there is a steady improvement, due to the fact that marsh gas possesses some luminosity, and is not to be regarded as a non-illuminant. A mixture of 8 per cent. ethylene with 92 per cent. methane possesses a value of 18 candles. It is only to be expected that the intrinsic luminosity of ethylene is improved by the addition of methane, and that it increases with the proportion

*See Journal, Vol. XIII., p. 345. †*Ibid.* Vol. XLV., p. 435.
‡See *Chem. Soc. Journal*, Vol. XLV., p. 154.
§See Journal, Vol. XLIV., p. 17.
‖See *Chem. Soc. Journal*, Vol. XLVII., p. 235.

*See Journal, Vol. XIII., p. 345.
† See Journal, Vol. XLII., p. 975. *Chem. Soc. Journal*, Vol. XLV., p. 30.

added. The principal feature of these experiments is the elucidation of the fact that so long as the proportion of non-luminant (which does not, of course, include methane) does not exceed 50 per cent., the intrinsic value of ethylene is not depreciated. But that, beyond this proportion, it rapidly falls off. The proportion of ethylene and hydrogen in ordinary gas is usually in excess of 1 : 10, or the limit which was found in the experiments to represent a non-luminous mixture. From this it appears that the ethylene in coal gas is completely neutralized and rendered useless, unless the presence of a proportion of methane, also of other illuminants, has an influence on the result. This point would be elucidated if Dr. Frankland's experiments were extended in order to include mixtures of the diluents, and also to other illuminants besides ethylene.

In order to obtain butylene as nearly pure as possible, Anderson prepared oil gas by admitting a slow stream of lard oil into a red-hot iron retort.* This was copiously washed by being passed through a long series of Woulff's bottles, first in potash solution, and lastly in pure water. It was thought that this treatment would practically remove ethylene and much of the methane, leaving only a mixture of butylene, hydrogen, carbonic oxide, nitrogen, and some residual methane. The mixture yielded a brilliant white light in the photometer burner, the flame extending nearly to the top of the chimney. Its value was 21·5 candles, and the bromine absorption was 18½ per cent. An attempt was made to isolate the butylene, by passing the gas slowly through U tubes surrounded by a mixture of ice and salt, but without effect, notwithstanding the statement made by some authorities that butylene is liquified by exposure to 0° Fahr. The dilution of the butylene appeared to confer upon it increased power of resistance to liquification. This experiment is only useful as illustrating the fact that butylene possesses a very high illuminating value, considerably exceeding that of ethylene. A mixture of 18½ per cent. of it with non-luminous gases and a little methane gave a value of 21·5 candles, which is greatly in excess of what we might expect, if the butylene were replaced by ethylene.

Professor Frankland and Dr. Thorne have tried some experiments on the illuminating power of hydrogen,† methane, and carbonic oxide respectively, when saturated with benzene vapour. The gases were passed through a brass cylinder packed with sponge saturated with pure benzene, and kept at a constant temperature by immersion in water. The quantity of benzene vapour taken up was ascertained by absorption with sulphuric acid. The gas was burned through a fishtail burner, which places the results on rather a different footing to those previously noticed. The results calculated out to standard pressure and temperature, give the following values for 5 cubic feet of benzene vapour :—

With hydrogen as a diluent	348·5	candles
„ methane as a diluent	466·5	„
„ carbonic oxide as a diluent . . .	366·9	„

From these it will be seen that the value of benzene as an illuminant is very much higher than that of the hydrocarbons already noticed. Calculated out in terms of weight, 1 lb. of benzene, when diluted with hydrogen, is equivalent in lighting value to 5·8 lbs. of spermaceti; with carbonic oxide, it is worth 6·1 lbs.; and with marsh gas, 7·8 lbs.

The New Railway Rates.—In the House of Commons last Tuesday, Sir Michael Hicks-Beach, in answer to Mr. Hulse, stated that upwards of 3000 objections had been received to the schedules of the railway companies with regard to their proposed new maximum rates. The railway companies had been directed to arrange for interviews with the objectors; and every possible facility would be given to enable the latter to submit their cases to the Board of Trade.

The Quality of the London Gas Supply.—The return made by Mr. W. J. Dibdin to the London County Council for the week ending the 4th inst., shows that the quality of the gas supplied by the London Companies on no occasion fell below the standard of 16 candles at any of the testing-stations. The maximum of sulphur present at any station was 13·4 grains per 100 feet as the highest, and 6·4 grains as the lowest. Ammonia varied between 1 grain per 100 feet as the highest quantity and absolutely no trace in several instances. Sulphuretted hydrogen was never present. The pressure was tested in four different instances, during the hours of maximum consumption, and gave results of 2·2, 2·5, 3·0, and 3·1 inches—against the prescribed minimum for the time of 1 inch.

The Eiffel Tower Light Useful for Once.—According to their "Paris Exhibition Notes," our contemporary *Engineering* is able to report that the great electric beam from the Eiffel Tower was turned to a good purpose the other evening. A large barge, loaded with about 400 tons of sand, struck one of the piers of the Pont de Grenelle in passing under the bridge, and was seriously damaged. A force of men was immediately put on to unload the barge, and prevent it from sinking in the channel; but as the work was not finished at nightfall, a message was sent to M. Compagnian, who was in charge of the light installation, begging him to direct a beam towards the site of the accident about 1500 yards away. This was done; and the illumination was so successful that the work was carried on without interruption, and much inconvenience was saved to the traffic on the Seine by preventing the barge from settling down in the channel.

* See Journal, Vol. XIII., p. 490. † *Ibid*, Vol. XXXI., p. 167.

Technical Record.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

The Programme of the Annual Congress.

The Annual Congress of the Société Technique de l'Industrie du Gaz en France will open to-day in the Gas Pavilion at the Paris Exhibition, under the presidency of M. Cornuault, and extend over the week. The official programme of the meeting is published in the current issue of the *Journal des Usines à Gaz*; and we are enabled therefrom to give our readers an epitome of the arrangements. The proceedings will commence with the ordinary general meeting, at which the reports of the Committee and the Treasurer will be presented, new members admitted, and members of the Committee nominated. This will comprise the morning's work. In the afternoon, the President will deliver his Inaugural Address, the various awards offered by the Society will be bestowed on the successful parties, and the rest of the available time will be devoted to the reading and discussion of papers. In the evening, there will be a reception of the members at the Gas Pavilion. On the following morning the reading and discussion of papers will be resumed until the midday adjournment; the afternoon being devoted to conferences by Mons. D. Monnier and Madame Alting-Mees—the former on mains for supplying the electric light, and the latter (to which ladies will be admitted) on cooking by gas. At the conclusion of these discourses there will be a visit of inspection to the Gas Pavilion. In the evening, the usual subscription banquet will take place at the Hôtel Continental; after which those members who desire to do so will have an opportunity of visiting the central electric lighting station at the Palais Royal. Papers and discussions, together with a discourse by M. Lechatelier, on new pyrometric appliances (in the course of which he will describe a new pyrometer), will occupy the members on the morning of Thursday; the afternoon being set apart for a visit to the new works of the Paris Gas Company at Le Landy, near St. Denis. Friday morning will be spent in the exhibition; the afternoon, in discussing other papers, and in hearing a discourse by M. Hospitalier, on electricity meters. On Saturday morning the members will inspect the electric light works at the exhibition. This, it is expected, will fully occupy them till after midday, as no other business is put down for the morning. In the afternoon, any papers remaining will be disposed of, and the meeting brought to a close.

Two papers have been sent in, in competition for the prizes offered by the Society. One deals with the radiation of heat, considered in its application to lighting and heating; and the other is on the subject of ventilation by gas.

The following are the titles of the communications to be submitted to the meeting :—

"The Washing and Purification of Gas," by M. Alavoine.
"The Purification of Gas," by MM. Aguitton and Debenoist.
"The Working of a Gasholder Station, and the Loss of Pressure in Supply Pipes," "The Protection of Underground Branch Pipes," by M. Avril.
"A 'Rational' Scrubber for Gas-Works," "An Arrangement for Cleaning Water-Level Tubes while in Use," by M. Chevalet, who will also contribute two notes on clarifying and re-heating water for use in steam-boilers, and on feed water in gas-works.
"The Classification and Calculation of the Various Losses of Gas, with the View of Establishing a Leakage Account," "The Possible Benefit of Undertaking a Supply of Electricity, as shown by some American Official Statistics," by M. Delahaye, who will also deal with the subject of the selling price of gas.
"Searching for Leakages of Gas from Mains by means of the 'Dry Isolator,'" by M. Deleury.
"The Manufacture of Sulphate of Ammonia," by M. De Lachomette.
"The Clamond Burner," by M. Denayrouse.
"Gas Analysis," by M. Egraz.
"Croc and Grebel's System of Lighting and Extinguishing Gas," by M. Grebel.
"A New System of Sealing Retort-Lids without Luting," by M. Laurain.
"A New Recuperative Carbonic Oxide Furnace, with Continuous Circulation, constructed at the Rouen Gas-Works," by M. Lauras.
"A Historical Sketch of the Construction of Gas-Retort Furnaces," by M. Lencauchez.
"The Construction of a Transparent Heat-Dispersing Screen," by M. Litschfousse.
"The Rational Arrangement of Condensers," "The Use of Soda in the Treatment of Ammoniacal Liquor," "The System of Laying on Gas Gratuitously at Lille: Results of the First Year's Working," by M. Melon.
"Heating by Tar," by M. Moirand.
"Some Experiments in Photometry," by M. Salanson.
"Loss of Electricity compared with Leakage of Gas," by MM. Serment and Prat.
"A Safety Burner with Automatic Closing Arrangement," by M. Serment.

Opening of the Gas Pavilion.

The Gas Pavilion, in which the meetings of the Society will be held, was formally opened on Friday, the 31st ult., when a brilliant assemblage accepted the invitation of the Committee under whose supervision the building has been erected and furnished, to be present at the inaugural ceremony. With regard to the structure itself, which is situated in a well-chosen spot at the foot of the Eiffel Tower in the gardens of the exhibition, our readers may be referred to the illustrated description of it which was given in the supplement to the Journal for the 12th of March last, for particulars as to its general appearance and interior arrangements; the further details we are now able to furnish, from the current issue

of the *Journal des Usines à Gaz*, relating simply to its fitting up for its special purpose—viz., to illustrate the application of gas for lighting, heating, ventilation, and motive power.

Commencing with the basement, the gas-engine gallery contains samples of the motors of Lenoir, Otto, Ravel, De Forest, and other makers, of varying capacities up to and even beyond 50-horse power. These engines are not merely exhibited for show; they are actually employed in working centrifugal pumps which raise the water for all the purposes of the building, particularly for the lift, and one drives the generator for furnishing the electricity used for lighting the parlour on the first floor. The lighting of the engine gallery is done mainly by groups of albo-carbon lamps. The experiment gallery consists of a chemical laboratory and a complete collection of photometric apparatus, all furnished with the latest improvements. The kitchen contains a very large gas-oven, fixed under a hood, with all the necessary accessories—grillers, pastry-ovens, &c. It is lighted by four ventilating regenerative Wenham lamps; the products of combustion being carried out of the building by special conduits in the ceiling. The circular space in the basement, set apart for the display of gas lighting and heating appliances, contains a large assortment of these articles, in the arrangement of which no attempt has been made at effect—their purpose being purely industrial.

On the ground floor, the library (a room in carved oak) is lighted by a lustre composed of twelve regenerative burners enclosed in tinted glasses. Against the wall there is a case containing samples of all the colouring materials and of the derivatives of coal tar employed for industrial purposes. The smoking-room, arranged in the Oriental style, is lighted by a lustre in keeping with the general character of the apartment, and fitted with Welsbach burners. The walls of the grill-room are decorated with artistic tiles. In a fireplace of large dimensions, there is placed the grill, fixed after the English fashion, which allows visitors to see grilling by gas actually in operation. This room is lighted by a sunburner of pretty pattern in the centre, with four Siemens burners in the corners. The lecture-hall occupies almost the entire height of the building and is covered by a glass dome. The place of honour is given to a statue of Philippe Lebon, the inventor of gas lighting. This statue is similar to the one erected under the auspices of the Société Technique not long ago at Chaumont, Lebon's native place. Upon the walls below the cornice are the names of the illustrious men whose combined efforts resulted in establishing the gas industry. Murdoch, Clegg, Dumas, Regnault, Siemens, Pauwels, Pelouze, and others. A large central lustre, of the kind used in theatres, lights the hall, with the assistance of eight small lustres disposed round the walls. The historical exhibition consists of a valuable and interesting collection, brought together with considerable difficulty by a distinguished *savant*—M. Dallemagne—and comprising specimens of all kinds of ancient lighting appliances, from the Roman lamp down to the lustre of the First Empire. All the samples have been carefully classified, and are exhibited with their date and history attached. Wenham ventilating lamps supply the light for this gallery, which is one of the curiosities of the pavilion.

The first floor contains some elegantly furnished rooms. The drawing-room, which is luxuriously fitted up in the Louis XVI. style, is lighted principally by an exceedingly beautiful lustre; and the floral verandah, into which the room extends, by incandescent gas-lamps. The parlour is furnished in the Louis XV. style; and, as before stated, it is lighted by electricity. The object of the Organizing Committee in making use of this illuminant was to show that, as a "light of luxury," it might be effectively used in certain apartments; and that when so employed the gas-engine is one of the simplest forms of motive power that can be utilized for the purpose of generating it. The bed-room is a marvel of elegance; everything being arranged to accord with modern notions of convenience and comfort. A special feature in connection with the gas-fires in this and the preceding rooms is that the asbestos appears like coral when it becomes incandescent under the action of heat. The work-room is lighted by a lustre of hammered iron, as well as by two elegant brackets on the walls. The general lighting of the billiard-room is effected by a new method—a luminous cornice. A special billiard-table light, with Chabot burners, completes the arrangements. The lustre which lights the dining-room is composed of eight recuperative burners, arranged in a circle round a central burner, and so fitted into the ceiling that while the table beneath is effectively illuminated, the atmosphere of the room is kept fresh and pure.

Coming to the exterior of the building, the dome already referred to is surmounted by a figure bearing two powerful gas torches, the flames of which light up the side of the neighbouring Eiffel Tower. A row of gas-jets illuminates the dome; and upon other parts of the roof powerful gaslights lend their aid to make an effective display.

Leaving the notice of the contents of the building for a future article, it only remains to be said now that the proceedings on the opening night were of a very brilliant character. The Committee's invitations had been sent to all the notabilities—scientific, commercial, and financial—of the city; and the result was a vast assemblage of people who were curious to see what gasmen had been capable of doing. The majority of them were doubtless much astonished at what they saw. The guests were received by the Chairman of the Organizing Committee (M. Albert Ellissen), the President of the Société Technique (M. Cornuault), and other colleagues. The Paris Gas Company (who have contributed very largely to the fund by means of which the building has been erected and furnished) were represented by M. Duval, the President, M. Camus, one of the Directors, M. Hart, the General Manager, and several members of the engineering staff. It is, of course, impossible to enumerate the many distinguished visitors present. Suffice it to say that they included M. Tirard, President of the Ministerial Council; MM. Constans and Lockroy, Deputies, and the Directors of the International Exhibition. The programme was arranged so as to offer a combination of professional and artistic attractions. For the general public, the interest was confined to the rooms on the ground floor of the building. There was an excellent concert in the lecture hall; the *buffet* in the grill-room was liberally supplied; while in the smoking and work rooms the performances of the phonograph and graphophone were followed with keen interest. The opening ceremony was altogether a great success, which it is to be hoped may be taken as a good augury for the future career of the building, the contents of which will doubtless be objects of interest to large numbers of visitors to the exhibition.

INSTITUTION OF CIVIL ENGINEERS.

The Annual General Meeting of the Institution was held on the 28th ult., for the purpose of considering the report and accounts for the past twelve months, and to elect the Council and officers for the ensuing year. The President (Sir George B. Bruce) occupied the chair.

In the course of the Council's report it was stated that the Institution included within it civil engineers of every denomination; but at the same time the Council made a rigid inquiry into the qualifications of all candidates seeking membership; while no person was admitted a student unless he could produce evidence of a competent knowledge of certain elementary subjects of general education. Considerable attention had been devoted by the Council to the composition of its own body; it having been thought that a more rapid change would be beneficial to the interests of the Institution. But the Council had been unable to take any decided steps in the matter. On the other hand, it was considered advisable that the presidentship should be held by the same person for two successive years, instead of one year, as had generally been the case recently. The number of members of all classes on the roll of the Institution on the 31st of March was 4739; being an increase of 4 per cent. in the twelve months. The numbers were thus distributed: Honorary Members, 19; Members, 1657; Associate Members, 2613; Associates, 450. At the same date there were 989 Students on the register. There were last session 25 ordinary meetings; but only 14 papers had been read and discussed, for some of which the Council have made awards, as well as for some of the papers printed in the volume of proceedings without being discussed. In the latter category may be mentioned a Telford Premium to Mr. Bryan Donkin, jun., M. Inst. C.E., for his account of "Experiments with Gas-Flame Jackets." and a Telford Premium to Professor Victor Auguste Ernest Dwelshauvers Dery, for his "Reduction of Experiments on the Effect of Superheating, Steam-jacketing, and Gas-Flame Jackets on Cylinder Condensation." Twelve supplementary meetings for students had been held, which had been well attended, and thirteen papers read and discussed. Among the awards made in respect of these was a Miller Prize to Mr. W. W. Fitzherbert Pullen, Wh.Sc., for his account of "Water-Softening and Filtering Apparatus, for Locomotive Purposes, at the Taff Vale Railway Company's Penarth Dock Station near Cardiff."

The report was adopted, and it was ordered to be printed in the minutes of proceedings. Hearty votes of thanks were then passed to the President, to the Vice-Presidents and other Members of the Council, to the Auditors, to the Secretaries and Staff, and to the Scrutineers.

The ballot for the new Council resulted in the election of Sir John Coode, K.C.M.G., as President; of Mr. G. Berkley, Mr. H. Hayter, Mr. A. Giles, M.P., and Sir Robert Rawlinson, K.C.B., as Vice-Presidents; and of Mr. W. Anderson, Mr. Benj. Baker, Mr. J. W. Barry, Mr. E. A. Cowper, Sir James N. Douglass, F.R.S., Sir Douglas Fox, Mr. J. C. Hawkshaw, M.A., Mr. C. Hawksley, Sir Bradford Leslie, K.C.I.E., Mr. G. F. Lyster, Mr. J. Mansergh, Mr. W. H. Preece, F.R.S., Sir E. J. Reed, K.C.B., F.R.S., M.P., Mr. W. Shelford, and Mr. F. W. Webb, as other members of the Council.

The session was then adjourned until the second Tuesday in November.

London Fogs.—The Sanitary and General Purposes Committee of the London County Council have been instructed "to take into consideration the causes of the fogs which trouble London during the winter months, and the increased death rate during their prevalence, in order to put in force existing powers for dealing with them, and obtaining increased powers, if necessary."

Death of Mr. James Stelfox, Senr.—The death is announced as having taken place on the 1st inst., at Southport, of Mr. James Stelfox, senr., who in 1875 was succeeded in the management of the Belfast Gas-Works by his son, the present Engineer and Manager of the undertaking. The deceased gentleman, who was of the good old age of 80, was resident in Belfast for 24 years; and only resigned his charge there on the transfer of the gas-works from the old Company to the Town Council. Mr. Stelfox leaves a large circle of friends both at Belfast and Southport (where for some time he has resided), as well as in the gas engineering profession generally.

Register of Patents.

DISTILLING TAR.—Lennard, F., of East Greenwich. No. 7334; May 17, 1888. [11d.]

According to this invention the tar to be distilled is caused to pass in films or streams of small depth over surfaces heated with the intervention of a bath of oil or other liquid which can be conveniently raised to, and maintained at the temperature necessary for distillation. To ensure the effectual working of the still, the tar before being admitted to it should be raised to such a temperature that distillation commences immediately on entering the still. The volatile products are collected as they arise; and the pitch passes off at the outlet. Steam is injected into the still to facilitate the distillation.

The following is a convenient arrangement proposed:—In a furnace there is mounted a vessel or trough for containing the oil or liquid used as the vehicle for heating the still, which is immersed in the liquid. The still has a number of divisions in it; the bottom surfaces between each division being lower and lower as they recede from the inlet and approach the outlet—so that the tar can flow from one to the other. The partitions have openings alternately at opposite sides of the still; and the bottom surfaces or floors of the still are preferably inclined alternately in opposite directions, transversely of the still. In this way the tar passes over the bottom surface in one direction transversely to the length of the still, and then on to the next lower bottom surface in the opposite direction; and so on in alternately one and the other direction from each bottom surface between the partitions to the one next below it to the exit. A steam-pipe is led into the still; and branches therefrom with outlet jets are situated in each division of the still near to the bottom surfaces. The first division of the still and several of the following divisions have wells below the bottom surfaces, with divisions therein; and steam-jets are led to the lower part of it, so that the tar on its way through the still passes from the bottom surface into these wells, then overflows on to the surface again, and passes thereover into the next compartment, and down the well in that compartment so as to overflow from that well, and so on—the steam in the well thoroughly acting on the tar therein. The products of distillation pass into a pipe with openings into each division of the still, and thence through a condenser so as to be collected and treated in the usual way. It is preferred to heat the tar for supplying the still by passing it through a coil immersed in the liquid bath; and also to use the condensed liquors for assisting in condensing the gases, the heat of which will drive off the more volatile products. These naphtha and creosote vapours can be passed into a tower, from the top of which the naphtha vapours pass off to be condensed, while the creosote passes off at the lower part. The anthracene and heavy oils remaining behind are led off as they accumulate. The tar may, on its way to the coil in the liquid bath, also be used for assisting in condensing the vapours passing from the still.

GAS AND LIQUID HYDROCARBON ENGINES.—Wordsworth, C. T., of Manchester. No. 7521; May 22, 1888. [8d.]

This invention (parts of which are applicable to various types of gas or liquid hydrocarbon motors) has for its object, firstly, the better and more effective means of obtaining a high or long range of expansion of the combustible gases in the working cylinder, and thus producing a greater economical effect on the piston than has heretofore been realized in motors receiving an impact every second or third revolution when working at full power; also in utilizing in some cases a portion of the heat from the residual gases and surrounding parts of the cylinder, in a volume of air, before the part of the contents of the cylinder which is nearest to the piston is finally expelled from the exhaust port; and, lastly, a particular arrangement specially adapted for producing a suitable mixture of gas which may be used for igniting the combustible compound in the working cylinder.

GOVERNORS FOR GAS-ENGINES.—Delamare-Debouteville, E. F., and Malandin, L. P., of Fontaine-le-Bourg, France. No. 9249; June 25, 1888. [8d.]

This governor is, say the patentees, based (in the first place) on the laws governing the fall of bodies in space, and (in the second place) on the duration of the oscillations of a pendulum, which duration diminishes as the rod is shortened and the weight increased. In considering the construction of this governor, they say, it must be remembered that governors for gas and other like engines have two distinct functions to perform—to admit the motive fluid, or shut it off altogether. When the governor admits gas to a gas-engine, for example, an explosive mixture is produced, which is exploded, and an impulse is thereby imparted to the piston. In case the speed of the motor exceeds the normal rate, the governor simply causes the gas-inlet to remain closed, in order to diminish the speed. In constructing a governor according to this invention, however, a differential pendulum is employed, composed of a rigid rod oscillating on a suitable axis, and preferably provided with two weights, one above and one below the centre of oscillation. This pendulum is provided at its lowest end with a notch or tooth capable of engaging with one end of a lever rocking on an axis connected to or moving with the slide; while the other end of the lever is capable of acting on a sliding or other piece connected to or operating the gas-valve, which is closed by a suitable spring. The action of this governor is as follows:—When a charge of gas has been admitted, the slide moves to the right (for example) with the lever, one arm of which then pushes the lower end of the pendulum in the same direction. When the slide is moved to the left, the end of the lever which moves with it acts upon the gas-valve, and admits a charge of gas; and at the same time the other end engages with the tooth or notch on the pendulum, whose centre of oscillation is situated nearly vertically over this end of the lever when the latter is at the left-hand end of its stroke. The relative positions of the lever and the centre of oscillation are preferably so arranged that when the lever is in this position—*i.e.*, at the left-hand end of its stroke—the pins on which the pendulum oscillates are lifted out of their bearings, and the whole weight of the pendulum rests on the end of the lever. When the lever moves to the right, it carries the lower end of the pendulum with it; and as the lever moves in a straight horizontal line, the pins on which the pendulum is suspended first descend on to their bearings, and the lever end then slides on the side of the pendulum below the notch or tooth. On the return of the slide, the lever moves to the left, with a degree of rapidity corresponding to the rate at which the engine is running. By suitably adjusting the weights on the pendulum, the latter is caused to oscillate at a fixed rate when left to itself; and when the slide and lever move to the left at this or any slower rate, the pendulum follows up the lever, and the end of the latter re-engages with the tooth or notch on the pendulum. On the other hand, when the slide and lever move at a rate more rapid than that for which the pendulum is adjusted, the latter is left behind; and the end of the lever, failing to re-engage with the tooth or notch on the pendulum, rises and thereby lowers the other end, and it consequently misses the part connected to the gas-valve, so that the latter remains closed.

APPLICATIONS FOR LETTERS PATENT.

8702.—EMERY, A. F., "An improved hook or hanger for inside ovens of gas and other cooking-stoves, also an improved grid." May 27.

8736.—ROBINSON, W. G., "Improvements in gas generating and burning apparatus for lamps." May 27.

8754.—LE POIDEVIN, T., "An improved gas apparatus." May 27.

8805.—CLERK, D., "Improvements in gas-engines." May 28.

8832.—WILLIAMS, H., "Improvements in apparatus employed in the manufacture of water gas for heating and lighting purposes." May 28.

8892.—HATTON, G., and LYTHGOE, R., "Improvements in gas producers and other furnaces." May 19.

8932.—RYDILL, G., "Improvements in connecting pipes, tubes, or plugs to water-pipes, taps, or valves of water supplies, gas-fittings, or to gas or petroleum pipes, and necks of openings." May 29.

8960.—WASTFIELD, E. G., "Improvements in and relating to gas-engines." May 29.

9048.—LEE, H., and HILLIARD, W., "Detector and regulator of excessive gas pressure, consumption, and leakage." May 31.

9061.—VAN STEENBERGH, B., "Improvements relating to the manufacture of water gas and to apparatus therefor." May 31.

9074.—WARWICK, R., "Improvements in the electric ignition of gas." May 31.

EXTENSION OF THE BEDFORD GAS-WORKS.—Extensions are being made in the retort-house of these works by the addition of new benches, with all the necessary ironwork. The work is being carried out by Messrs. R. and J. Dempster, of Manchester.

THE PRICE OF GAS AT BLACKBURN.—The Gas Committee of the Blackburn Corporation have decided to reduce the price of gas in the town 1d. per 1000 cubic feet. This reduction, which will commence from the 1st of July and be subject to the usual discount, is in gas for ordinary lighting purposes. The future prices of gas will therefore be 3s. per 1000 feet to small consumers, and 2s. 9d. per 1000 feet to large consumers.

NEW WATER GAS COMPANIES.—The following new water gas companies have been registered:—The Von Langer Water Gas Company, with a capital of £151,000, in 30,000 ordinary and 200 founders' shares of £5 each, to acquire and develop the inventions and processes of Ivan Langer and L. Cooper relating to water gas. The Staffordshire Water Gas Company, Limited, with a capital of £120,000, in £5 shares, to acquire an exclusive licence to use, and to grant licences for the use in Staffordshire of Nicholson's patents for improvements in the methods and appliances for "obtaining and cleansing gas from coal."

CITY OF WELLS GAS COMPANY.—The annual general meeting of this Company was held at the Town Hall, Wells, on Friday, the 31st ult. The results obtained during the year placed the Company in the satisfactory position of being able to pay 10 per cent. on the old capital, and carry forward a substantial balance; but having regard to the fact that it was intended to reduce the price from 4s. 6d. to 4s. 2d. per 1000 cubic feet, a dividend equal to that of last year was declared—viz., 8 per cent. The Secretary and Manager (Mr. C. V. Bennett) was complimented upon his successful services, and, in acknowledgment, was voted a sum commensurate with the additional profit derived.

THE PRICE OF GAS AT RIPON.—At the monthly meeting of the Ripon City Council yesterday week, there was a long debate on the question of reducing the price charged for gas. The Gas Committee recommended a reduction of 2d. per 1000 cubic feet—from 3s. 6d. to 3s. 4d. Alderman Mountain moved, as an amendment, that the price be reduced to 2s. 6d. per 1000 feet; that the allowance for discount be discontinued; and that the public lamps be charged an additional £1 per annum. Mr. Collinson seconded the amendment, and stated that considerable sums had been charged to revenue which should have been charged to capital—thus keeping up the price to the consumers. The amendment was lost by the casting vote of the Mayor; and ultimately the whole question was referred back to the Gas Committee.

GAS PROFITS AT HAWORTH.—At last Tuesday's meeting of the Haworth Local Board, the Gas Committee brought forward a recommendation that the resolution passed in October last, raising the price of gas 3d., be rescinded. A member inquired the reason for this. Mr. Harper said that when the price was raised, it was generally felt that there would be a loss on the gas-works this year, as in previous years. Instead of a loss, however, there was a considerable profit; and they felt, therefore, that there was a very good reason for doing away with the increase. Mr. Redman took exception to the printed balance-sheet, showing a profit for the past year on the gas undertaking of £450; and he argued, at length, that were everything to appear in the return, there would be no profit at all. Mr. Harper, the Chairman, and other members stood by the report, and expressed their confidence in the future of the gas-works under the new Manager. The recommendation was approved.

THE USE OF GAS-STOVES AT CARLISLE.—On Monday last week a series of cookery lectures was commenced by Mrs. Thwaites in one of the showrooms of the Carlisle Gas and Water Committee. In the absence of the Chairman of the Committee, the Engineer, Mr. J. Hepworth, introduced Mrs. Thwaites at the first lecture, and explained that the Committee had a two-fold object in promoting the lectures—they wished to give further illustrations of the benefit of cooking by gas, and to show any improvements that had been introduced in cookers since the last lectures had been delivered; and secondly, they wished to increase the consumption of gas. Experience in the Committee's offices showed that the cookers were becoming more popular every year. At the present time they had about 400 in use in the town; and in addition there were 600 other gas-stoves and heating appliances in operation. He pointed out the cheapness of cooking by gas as compared with coal, and referred to the advantage in summer, at all events, of cooking entirely by gas.

Correspondence.

[*We are not responsible for the opinions expressed by Correspondents.*]

WATER GAS.

Sir,—Replying to Mr. Siemens's letter in your last issue, allow me first to express my admiration for what the late Sir William Siemens and your esteemed correspondent have already accomplished in the utilization of fuel by means of producer and other furnaces; thereby effecting considerable economy in the consumption of coal for manufacturing and other purposes, as well as aiding to abate the smoke nuisance in all our large towns.

When 160,000 cubic feet of producer gases are made per ton of coal, their calorific value must be less than 132 B. T. U. per cubic foot. For if we multiply 160,000 by 132 we obtain 21,120,000 B. T. U., to which must be added the sensible heat lost in cooling these gases from about 1800° to 60° Fahr., or upwards of 14,000,000 B. T. U. We have thus a total of over 35 million units per ton, which appears to me much higher than common coal contains.

In the tables given with my paper on "Water Gas," I have supposed the gases to be reduced to the standard temperature and barometric pressure of 60° Fahr., and 30 inches of mercury. This may account in some measure for Mr. Siemens's calorific equivalent for producer gases being so much higher than the figures I gave for mixed gases. Of course, his equivalent will be larger, for I have allowed 3 cwt. of coke per ton of coal to carbonize the coal in closed retorts in the first instance—the balance being then gasified. It should be borne in mind that when coal is distilled in closed retorts, we have residual products, consisting of tar and ammonia, to the value of about 3s. per ton of coal.

I agree with Mr. Siemens that when large quantities of fuel gas are required for manufacturing purposes, the simplest and cheapest plan is to convert the solid fuel into producer gas; and care should be taken to utilize, as far as possible, the sensible heat of these gases. It is the loss of this sensible heat when a large quantity of producer gases of comparatively low calorific value are made per ton of coal, that, in my opinion, is probably the chief disadvantage of distributing these bulky gases from a central station.

J. Ferguson Bell.

Stafford, June 6, 1889.

ON FLAME.

Sir,—My attention has been directed to Mr. Head's letter in your issue of the 28th of May; and I should like, with your permission, to make a short reply to it.

Mr. Head in effect says that in my remarks in reply to the discussion on my paper on "Flame," which you have reproduced, I misrepresented Mr. Frederick Siemens's views on two points; there being (1) the description of his theory of heating as first announced by him, and (2) his view of the correct theory of the nature of flame.

I recognize the exigencies of Mr. Head's position; but, apart from him, I am sure that it is unnecessary to justify my remarks to those who are practically interested in furnaces. I do not believe that any one understood Mr. Siemens in any other sense than the one conveyed by the words "heating by radiation only." Admitting that space must be provided for the flame to be produced, yet Mr. Siemens made it clear (in his first paper to which Mr. Head has referred, and in his remarks in the discussion on it) that his point was not so much to produce good combustion as that "the flame should only radiate heat upon the material to be heated or melted, and not come into contact with it." In order to prove that Mr. Siemens at that time did not regard complete combustion and heating by radiation as synonymous in terms or ideas, I quote the following remark which he made in the discussion referred to:—"There were several ways of saving fuel. One was by good combustion; a second was by increasing the intensity or temperature of the flame; and another was by utilizing the heat of radiation." (*Jour. Iron and Steel Inst.*, Vol. II., 1884, p. 477.) The fact that Mr. Siemens, in his 1886 paper, said of his plan that "it is *now* preferred to describe it under its more general term, as heating with free development of flame," is alone sufficient to show that he was conscious of having formerly described it in a different sense.

As to the second point, Mr. Siemens, besides the remark quoted by Mr. Head (*Jour. Iron and Steel Inst.*, Vol. II., 1882, p. 479, said (see p. 480): "*All the phenomena of combustion* were accounted for by the application of the electric theory which he had brought forward, and also, *but to a less extent*, by other theories;" and again before the Society of Chemical Industry (see the volume of the Society's *Journal* for 1885, p. 439) he said of the electrical theory, "which is the one accepted by the author."

Under these circumstances, others can judge whether I was justified in understanding that Mr. Siemens adopted that theory as the only one which explained the phenomena of combustion consistently with his views. The point I was making when referring to that was that a friendly exponent of Mr. Siemens's heating by radiation theory, who frequently poses as an authority, announced that that theory "entirely depended" upon quite another view of the nature of flame.

Mr. Head is, as usual when he indulges his taste for personalities, mistaken in his idea that I criticized what I had not read. If one may venture to offer advice to so belligerent a gentleman, it would be well if he endeavoured not to let his zeal (for his employer) outrun his politeness to his opponents.

Fred. Rowan.

Glasgow, June 4, 1889.

THE RAILWAY AND CANAL TRAFFIC ACT, 1888.

Sir,—You will observe from the date of the copy of the enclosed letter that I have lost no time in communicating the course the railway companies are about to pursue with reference to increased rates for the carriage of coals, or, to put it more correctly, the abolition of rebates—ranging from 9d. to 2s. per ton, according to distance—heretofore exercised.

I cannot help thinking that if London were not supplied by seaborne coals, this matter would have attracted earlier and important attention. As it is, the provinces are threatened; and so far as Worcester is concerned it amounts to £1000 per annum, with an increased cost of carriage of coals. Collieries are also demanding a considerable advance in the price of coal; and this, with the proposed abolition of rebates, will, I think, equal 4d. per 1000 cubic feet of gas.

The contention of my Company is that gas companies ought to be exempt from the operation of the above Act. Gas companies are not *traders* in coal; and being under statutory prohibition as to the price of gas, &c., they ought to be excluded from its operation. Moreover, it is ludicrously idle to suppose that anyone could be found to allege that rebates on gas coal would be held "to be an undue preference," as per enclosed. Who is there that could, or would, advance such an argument, when manifestly the lowest price of gas for public and private consumption is everywhere demanded.

Clause 27 of the above Act is insultingly quoted by the railway companies. There is not, I think, an atom of common sense in the matter. Until within the last few days, the Worcester Gas Company were lulled by railway officials into the belief that existing rates would not be disturbed; but now that time for appeal to the Board of Trade has expired a mine has been sprung, as mentioned in the enclosed. It certainly means a tax upon gas companies amounting to many hundreds of thousands of pounds annually, to be put into the pockets of the railway companies.

J. Deakes.

Worcester, June 7, 1889.

[Enclosure.]

"*Midland Railway General Manager's Office, Derby, June 5, 1889.*

"Dear Sir,—In reply to your letter of the 27th ult., I beg to say that in the opinion of the railway companies, it is, to say the least, exceedingly doubtful whether rebates on gas coal would not be held to be an undue preference. The large preponderance of opinion is that it is so far doubtful, that the railway companies should not subject themselves to the serious risk which any contravention in this respect of the provisions of the Railway and Canal Traffic Act, 1888, would entail upon them.—I am, Yours faithfully,

"John Noble."

THE STAFFORDSHIRE WATER GAS COMPANY.

Sir,—As I find my name is being used unwarrantably in the prospectus of the above Company, I shall esteem it a favour if you will insert in the next issue of the Journal the enclosed letter, which I have just sent to the *Yorkshire Post*.

H. Townsend.

[Enclosure.]

Sir,—I notice in to-day's *Yorkshire Post* the prospectus of the above Company, which contains the following:—"Mr. Townsend, of Dewsbury, is reported in *Gas and Water*, June, 1885, as vouching that water gas, at even 6d. per 1000 feet, is more economical than coal for steam-engines." I beg to deny most emphatically ever having made the statement imputed to me, which is as absurd as it is mischievous. The use of my name in this prospectus is a gross piece of impertinence; my consent having neither been asked nor obtained.

H. Townsend.

Dewsbury, June 5, 1888.

A firm of fire-brick manufacturers, writing in reference to the statement contained in the letter of "Gas," in the Journal for the 14th ult. (p. 906), to the effect that silica bricks used in the construction of water-gas furnaces will not stand the necessary strain upon them, and to that of another correspondent—"Steel Maker"—who thinks that a new material must be found for building these furnaces, as "the best Welsh silica bricks will not stand all the heat that can be produced," ask to be informed by any of our readers as to the degree of heat these furnaces would have to endure.

Workington Water Supply.—At the monthly meeting of the Workington Town Council, the Surveyor (Mr. W. L. Eaglesfield), in accordance with instructions, presented a special report on the subject of the shortness of the water supply in certain sections of the town. He described the size and situation of the old water-mains, which were laid down in 1858. Several of the mains had, he said, been decreased in area owing to corrosion; and these had to distribute water to a large and increasing population. He estimated the cost of extra mains and new pipes required for a proper distribution of the water at £2216. The matter was briefly discussed; but no decision was arrived at.

An Experiment in Oil Lighting in the City.—The Engineer to the Commissioners of Sewers (Mr. W. Haywood) has reported to that body that experiments in street lighting are being made by The Gaslight and Coke Company and with petroleum safety lamps for a period of one year. The number of gas-lamps employed by the Company is 112; and the maximum illuminating power is 75 candles. The oil-lamps number 30; the maximum illuminating power being 100 candles, and ordinary petroleum oil is used. The thoroughfares experimentally illuminated are the Holborn Viaduct and Holborn Circus; those lighted by the Gas Company are several principal streets in the centre of the City.

South London Water Companies and the Battersea Vestry.—The Sanitary and Special Purposes Committee of the London County Council reported, at the meeting of that body last Tuesday, that they had considered a letter from the Vestry of St. Mary, Battersea, asking the Council to require the Southwark and Vauxhall and the Lambeth Water Companies to give a constant supply to the houses and premises within the parish. The Committee had communicated with the Companies; and the latter expressed their willingness to give a constant supply to the portion of the parish in the Company's district to which a constant supply had not already been given, without the Council requiring a constant supply under section 8 of the Metropolis Water Act, 1871. The Southwark and Vauxhall Water Company also stated that they would give a constant supply to the part of the parish of Battersea in their district at the end of the current year.

Water Gas and its Effect on Corporation Gas-Works.—At the ordinary meeting of the Bolton Town Council last week, Alderman Miles, the Chairman of the Gas Committee, quoted the opinion of an expert, to the effect that at present there was no fear of water gas competing with coal gas, as had been suggested by Mr. Healy at a previous meeting of the Council. The opinion of Mr. W. Foulis, of Glasgow, was that in this country, and under existing circumstances, water gas, whether supplied in its non-illuminating form or carburetted, could not compete with coal gas either in economy or efficiency. He (Alderman Miles) thought there was a good deal of fallacy about what had been said in regard to water gas. Alderman Dobson, who had previously given a very high opinion of water gas, said he had examined the matter, and had come to the conclusion that the Gas Committee had nothing to fear from the competition of water gas as an illuminant, whatever might be said about it for manufacturing purposes.

Parliamentary Intelligence.

HOUSE OF LORDS.

The following further progress was made with Bills up to the Whitsuntide adjournment (June 4):—

Bills reported: Bury Corporation Bill, Gas Provisional Orders Bill, Water Provisional Orders Bill.

Bills read the third time: Barry and Cadoxton Gas and Water Bill, Gas Provisional Orders Bill, Heywood Corporation Bill, Morley Gas Bill, Water Provisional Orders Bill.

HOUSE OF COMMONS.

The following further progress was made with Bills up to the Whitsuntide adjournment (June 4):—

Bills read the first time: Barry and Cadoxton Gas and Water Bill, Gas Provisional Orders Bill, Water Provisional Orders Bill.

Bills read a second time: Eastbourne Water Bill, Rastrick Water Bill.

Bills reported: Manchester Corporation Bill, Swansea Corporation Bill.

Bills read the third time: Tuscan Gas Bill.

Petition presented: Rastrick Local Board, against the Rastrick Water Bill.

Legal Intelligence.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

MONDAY JUNE 3.

(*Before the* LORD CHIEF JUSTICE *and Lords Justices* LINDLEY *and* LOPES.)

BRISTOL WATER-WORKS COMPANY *v.* THE MAYOR, ETC., OF BRISTOL.

This was an appeal by the plaintiffs from a judgment of Baron Huddleston and Mr. Justice Wills upon a special case, which was stated in the JOURNAL for Jan. 22 last (p. 161). The action was brought to recover expenses incurred by the plaintiffs in the repairing, moving, and altering the direction of certain water-pipes which had been laid by them along the quays and docks of Bristol, pursuant to the provisions of the Bristol Water-Works Act. The defendants are the owners of the freehold of a quay or wharf commencing at a place called the "Head of the Quay," which quay or wharf was of different depths. By a lease dated 1764, which was surrendered to the defendants in 1861, the defendants, as lessors, granted to certain persons a lease for 99 years of the quay or wharf. The lease contained a covenant that the whole ground which was open between the houses adjoining it and the river should continue open and free for the public use. The defendants had always exercised the right of erecting sheds, both open and enclosed, upon this space, when the requirements and convenience of the ships coming alongside to unload their cargoes demanded. They had recently constructed upon the quay a shed or building, which it was alleged deprived plaintiffs of the reasonable and necessary access to their mains and pipes, and had thus caused them to relay the pipes. The questions submitted to the Court were the following:—(1) Whether the plaintiffs are entitled to recover from the defendants the expenses of the alteration and removal of their mains and pipes consequent upon the erection by the defendants of a shed or building over the place where the same were laid. (2) Whether the plaintiffs are entitled to recover from the defendants the sums expended in the removals and making the changes required by the alterations made by the defendants in the level, direction, or situation of the quay or wharf. (3) Whether the plaintiffs are entitled to an injunction, restraining the defendants from erecting and maintaining sheds or buildings upon the quays and wharves over the mains either unconditionally or unless they pay compensation to the plaintiffs.

Mr. HENN COLLINS, Q.C., and Mr. PULLEN appeared for the appellants; Mr. POOLE, Q.C., and Mr. DE COLYER appeared for the respondents.

The LORD CHIEF JUSTICE said the case raised an important question of principle, though the actual sum at stake was small. It appeared to him that the answers to the questions must be conflicting, as neither party was entitled to entirely succeed. The plaintiffs were a Water Company empowered by Act of Parliament to do certain things; and the defendants were the Corporation of Bristol. The Corporation had vested in them, amongst other things, the quays and docks; and the question was who was to pay the expense of altering the Company's pipes and mains. One of the duties imposed upon the Company by the 72nd section of their Act of 1862 was that of placing pipes at convenient spots on the quays and docks, so that masters of vessels might obtain a supply of water. In whom was the supreme power of settling from time to time what were the "convenient spots" at which hydrants and pipes were to be placed? If it could be determined at once, on the true construction of the Act, that the Company were the sole arbiters as to the "convenient spots," they would fulfil their duty by putting down the pipes at places which they at the time thought "convenient," and there maintaining them; but if the Corporation had the power from time to time of saying what were "convenient spots" for the shipping which frequented the docks, then it was plain that at the different spots so fixed the Company were bound to place their hydrants. For the present purpose it seemed that the Corporation must of necessity from time to time say where these "convenient spots" must be. A spot which was convenient in 1820 might become very inconvenient in 1890. The Corporation had also vested in them the property in the docks and quays, and they had the right to place upon a portion of their property structures for the use of the shipping which resorted to the quays. They had also power, incident to the proper use of their property, of altering the levels and directions of a portion of the quay; and the question was, when they exercised either of these rights, at whose expense the alterations were to be effected. According to the 105th section of the Act, the alterations were to be made by the Company; and then arose the further question whether, when they had done the work, they could recover the cost from the Corporation. The answers to these two questions would be different for the reasons he would mention. He would first deal with the question of who was to pay the cost when an alteration was made in the level. In the Court below a preliminary question was raised which, if correct, would prevent the application of the 105th section to the matter before the Court. This section directed that if a board of health, turnpike commissioners, or other persons, should desire to alter the level of a street or road so as to render necessary the removal of the pipes, the water company were to do it, and the corporation were to pay for it; and the learned Judge who raised this question suggested that these quays did not come within the definition of "street" or "road." With the greatest possible respect, he thought the learned Judge seemed to have forgotten the operation of the Companies Act, because by the interpretation clause the word "street" was to include any "square, court, or alley, highway, lane road, thoroughfare, public passage, or space within the limits of the Special Act;" and if they were to strike out the interpretation clause, all these places would be excluded, and the Company would have no right to recover rates from persons living therein who were supplied with water. He thought the view taken by the learned Judge was too technical. If "street" included a public passage or space, the quay in question being a public place, if the Corporation, for their own benefit, made an alteration in the level, it was clear that they must pay to the Water Company the expense of the alteration. If the place of which they altered the level was a public place, it came within section 105 of the Bristol Water-Works Act; and the cost of any alteration (though they had a right to make it) must be paid to the Company. Then came the question, Supposing they desired a change in the position of the pipes supplying the ships, who was to pay for that? It seemed to him that the Company must pay it, as the onus was cast upon them; being part of the price they were content to pay for getting the Act, and part of the concession for obtaining power to exercise these rights. The pipes were put down at convenient spots; but over one of the spots the Corporation of Bristol had erected a shed, and the spot was thus an inconvenient place for supplying ships. It followed that the hydrant must be shifted. Then said the Company the cost must be borne by the Corporation, as their rights had been interfered with; and in support of this contention the case of *The Gaslight and Coke Company v. The Vestry of St. Mary Abbotts, Kensington*,* was quoted, where the Court held that the rights of the Gas Company were paramount to those of the Vestry. But in that case there was a distinct right conferred on the Company to have pipes in a particular spot; and as the Vestry interfered with that right the Court ordered that the damage should be paid for. But that was a very different thing from the duty imposed in the present case. Here the duty was, so to speak, of an ambulant nature, as spots which at one time were convenient at another time were not. The duty of the Corporation was to maintain pipes at convenient spots; and these spots must be reasonable within the discretion and judgment of the Corporation. The Act of the Corporation had made the particular spot inconvenient; but it did not provide for compensation being paid. He thought the first and third questions should be answered in the negative; the second in the affirmative.

Lord Justice LINDLEY said he was of the same opinion. The questions turned upon the conflicting rights of the Water Company on the one side and the Dock Company on the other; the first question being who was to bear the expense of removing the pipes. The second question, which raised an important point upon the true construction of the Special Act of 1862, and the Water-Works Clauses Act, 1847, had arisen in consequence of the dock owners having made an alteration in the level, direction, or situation along the quay or wharf. What the Dock Company had done in this respect was what was pointed at in section 105 of the Special Act. If the expression "street," in section 105, included wharves and quays, then the Special Act threw the expense on the Dock Company; if, on the other hand, it did not, then the Act was silent upon the subject. There was not in the Special Act any definition of the word "street" or "road;" but it incorporated the General Act of 1847, in which there was a definition clause, and "street" was there defined to include any public thoroughfare or public place. It was said that, notwithstanding the incorporation of this Act, "street" did not include wharves and quays; but he could not find any repugnancy or difficulty in construing the Special Act as including a wharf. The Court was driven to the conclusion that the word "street," in section 105, included a wharf, which was a public place. The Dock Company had erected certain sheds which made the removal of the pipes necessary; but, without straining language, he could not say this was an alteration of a street, and there was no statutory liability upon the Dock Company to pay compensation for the removal of the mains or pipes.

Lord Justice LOPES concurred.

Their Lordships ordered that the Water Company should have the costs in the Court below, but not those of the appeal.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

(*Before Mr. Justice* KAY.)

In re THE THURSO NEW GAS COMPANY, LIMITED.

A QUESTION OF COMPANY LAW.

This case raised the question as to whether section 163 of the Companies Act, 1862, which enacts that "where any company is being wound up by the Court, or subject to the supervision of the Court, any attachment, sequestration, distress, or execution put in force against the estate or effects of the company after the commencement of the winding up shall be void to all intents," applies in a voluntary winding up. The Thurso Gas Company was registered in England—its registered office being at Dewsbury, Yorkshire; but it carried on its trading business at Thurso, in Scotland. In February, 1887, John Young, one of the *employés* of the Company, was killed at their works at Thurso.† In June, 1887, his widow and children commenced an action in Scotland against the Company for damages. On Aug. 22, 1887, the Company passed a resolution for a voluntary winding up, and duly appointed liquidators. On Oct. 17, 1887, the plaintiffs in the Scotch action obtained letters of inhibition, equivalent to an injunction to restrain the Company from dealing with part of their assets to the prejudice of the plaintiffs' claim. The plaintiffs, though they had notice of the resolution to wind up, went on with their action; and at the trial on Nov. 24, 1887, obtained a verdict for £850 damages. On Jan. 20, 1888, the verdict was enforced by judgment in the Scotch action. A petition was presented for winding up the Company on June 6, 1888; and on the 16th, a supervision order was made. On April 20 of that year letters of arrestment, equivalent to a writ of attachment, had been issued against the Company's personal estate in Scotland; and on the 20th of June an order was made in the action, equivalent to a judgment for the costs of the action, amounting to £138 2s. 5d. Two summonses now came before the Court, one by Mrs. Young and her children for leave to proceed to enforce their judgments, and claiming a paramount charge on the property of the Company; and the other by the liquidators to restrain the plaintiffs from so proceeding, and from preventing them (the liquidators) from getting in the Company's assets.

Mr. MARTEN, Q.C., and Mr. BIRRELL appeared for Mrs. Young and her children; Mr. RENSHAW, Q.C., and Mr. NORTON for the liquidators.

Justice KAY said the only result the Court could come to on the Act of 1862 was simple and clear. The question was whether it was within the scheme of the Act that the claim now made by Mrs. Young and her children should be allowed. If the Court were to permit them to proceed with their action, and to levy execution, it would be giving them a priority over creditors, in violation of section 133, which especially said that, as one of the consequences of a voluntary winding up, the property of the Company should be applied in satisfaction of its liabilities *pari passu*. The *primâ facie* scheme of the Act made it improper that these creditors—the plaintiffs—should have priority over other creditors in the winding up. It was quite right that the action, which was for damages,

* See JOURNAL, Vol. XLIII., pp. 873, 917; Vol. XLV., pp. 533, 823.

† See JOURNAL, Vol. XLIX. p. 461; Vol. L., pp. 974, 1043; Vol. LI., pp. 32, 112, 1060.

and not for debt, should go for trial, as that was the proper mode of ascertaining whether any damages were recoverable, and if so to what amount; but whether the Court would allow these particular creditors priority for the fruits of their judgment was quite another question. The supervision order made all subsequent proceedings in the action absolutely void under section 163, subject only to the sanction of the Court to such proceedings under section 87. The case was one in which the Court ought not to allow the plaintiffs to have priority over the other creditors of the Company. To do so would be to disturb the imperative rule laid down by section 133. His Lordship then reviewed the authorities, and concluded by making one order on both summonses, dismissing the summons of the plaintiffs, and ordering them to do all necessary acts to enable the liquidators to sell and get in the property and debts of the Company; the plaintiffs to add their costs to their debt; and the liquidators to have their costs out of the assets. The plaintiffs would have liberty to prove for their debt and costs.

FRIDAY, JUNE 7.

A TRANSACTION IN BRITISH WATER GAS SHARES.

In this case Mr. Loeb, a mercantile agent, sought to restrain Mr. Fryer, a solicitor, from parting with certain shares in the British Water Gas Syndicate, Limited, which the plaintiff alleged belong to him. Plaintiff declared that he instructed the defendant (a friend of Mr. G. W. Hastings, M.P., a Director of the Company) to apply for 100 shares of £5 each; the defendant applying at the same time for 400 shares on his own account. Plaintiff alleged that if all the shares applied for by the defendant were not allotted, the plaintiff and defendant were to share those allotted in proportion to their applications. Plaintiff also was to pay the defendant one-third of the profits made by him on his shares. Defendant averred that the plaintiff was only entitled to any shares allotted above 400; and only 300 shares had been allotted to him (defendant). Plaintiff claimed 60 shares; being one-fifth of the shares allotted.

Mr. RENSHAW, Q.C., and Mr. HART appeared for the plaintiff; Mr. BRAMWELL DAVIS for the defendant.

Mr. Davis consented to an injunction being granted until the trial or further order against dealing with the 300 shares allotted to the defendant, or any of such shares; the plaintiff giving an undertaking in damages, and the defendant undertaking to pay into Court forthwith after receipt any dividends or other moneys received by him in respect of the 60 shares.

HIGH COURT OF JUSTICE, IRELAND—EXCHEQUER DIVISION.

THURSDAY, JUNE 6.

(*Before Mr. Justice* ANDREWS.)

THE SECRETARY OF STATE FOR WAR *v.* THE KILKENNY GAS COMPANY.

This is an action to recover from the defendants £661, an alleged overcharge of the War Department in respect of a supply of gas to the military barracks at Kilkenny since 1879. The War Department alleged a contract that, if the price of gas should subsequently be reduced to general consumers, a proportionate reduction should be granted to the War Department; and they averred that notwithstanding that reductions to the general consumers had since taken place, they had been charged the original contract rate. The Company by their defence denied the alleged contract; and also pleaded that in the year 1879 they transferred the gas-works to Mr. George Anderson, that they ceased to supply gas after that date, and that the alleged overcharges, if any, were made by Mr. Anderson, who had since been paid for all gas supplied to the department.

Mr. CARSON to-day applied on the part of the plaintiff for leave to amend the proceedings by making Mr. George Anderson, of Westminster, a co-defendant. There was also a motion for the discovery of documents.

Mr. MATHESON, on behalf of the Gas Company, said he could not resist the application, as the case of his clients was that Mr. Anderson was the person liable in the present action.

Justice ANDREWS granted leave to the plaintiff to amend the writ and statement of claim by adding the name of Mr. Anderson as defendant; the plaintiff paying the defendants' costs of the amendment. His Lordship also granted a discovery of documents.

THE THIRLMERE WATER-WORKS.—In the course of the proceedings at the meeting of the Manchester City Council last Wednesday, Alderman Windsor announced that £150,000 worth of 3 per cent. redeemable consolidated stock had been issued. Alderman Sir John Harwood explained that this stock had been issued in connection with the Thirlmere scheme; and the manner in which the public had taken it up had been an agreeable surprise to the Committee. The stock was redeemable in 40 years.

THE CIVIL PROCEEDINGS AGAINST SAMUEL HUNTER.—At the monthly meeting of the Salford Town Council last Wednesday, reference was made in the minutes of the Gas Committee to the tenders for supplying coal and cannel during the next twelve months; and in regard to this matter, Mr. J. G. Mandley inquired if these tenders would be finally disposed of before the Gas Committee, or the members of the Council, knew something of the civil action against Samuel Hunter. He also desired to know whether, so long as those proceedings were going forward, any contract would be entered into with any firm whose names appeared in the Corporation statement of claim as having given commissions to Samuel Hunter. Mr. H. Lord, the Chairman of the Gas Committee, replied that nothing would be done in accepting any of these contracts without communicating in the first instance with the Mayor, who had full knowledge of what was going on in the Hunter trial.

THE CARDIFF CORPORATION AND THE CONTRACTOR FOR THEIR NEW RESERVOIR.—A meeting of the Cardiff Corporation Water Committee was held yesterday week to consider what steps should be taken with regard to the action brought by Mr. W. Jones, the first contractor for the Cantref reservoir, against the Corporation for loss by eviction and damages. It was intimated that there appeared to be some disposition on the part of the contractor to make terms. Mr. Wheatley explained that the claim was for £55,000. The Committee gave Mr. Jones notice of eviction on Oct. 30, 1888, owing to the want of progress in the works; and they incurred a cost of from £800 to £900 in keeping up the works until the contract was relet. The action had so far advanced that a statement of claim had been submitted to the Corporation; and they had put in the counter-claim. Counsel had advised the Committee that they should issue a writ against him for the loss occasioned through delay, and claim the penalty of £100 per week. There was still some extra work to be done, amounting to £10,000. A few days since a Mr. Ward had inspected the works on behalf of the plaintiff, and had had interviews with him (Mr. Wheatley), and tried to make terms. The proposal was that the plaintiff, in consideration of the Corporation giving up certain points, would forego any claim for damages through removal, eviction, loss, and the railway. The Corporation were not to make any claim upon him for the delay in carrying out the contract, and the defendant should not make any claim for damages. After discussing the matter, a Sub-Committee was appointed to meet the plaintiff and if possible arrange terms.

Miscellaneous News.

ELECTRIC LIGHTING IN THE METROPOLIS.

THE "OBSERVATIONS" AND "SUGGESTIONS" OF THE LONDON COUNTY COUNCIL ON THE VARIOUS PROJECTS.

At the Meeting of the London Council last Tuesday—Lord ROSEBERY presiding—the Highways Committee reported that they had considered the various electric lighting schemes of the present session, and in connection therewith a letter from Mr. Henry G. Calcraft, of the Board of Trade (*ante*, p. 632) and the objections of the vestries and district boards to the several schemes. They had also had before them reports from the Solicitor and Mr. T. P. Gunyon, of the Engineers' Department, on the subject, and a further letter from the Board of Trade asking for the Council's observations on Major Marindin's report of the result of his inquiry into the several applications (*ante*, p. 955). The Committee had very carefully considered the questions relating to the future of electric lighting in London, and had embodied the conclusions at which they had arrived in the following letter, which they recommended should be approved and sent to the Board of Trade:—

The Council has had under consideration your letter of March 13 last, in which, referring to the electric lighting schemes of the present session, you express the wish of the Board of Trade to be furnished with any observations which the Council may have to offer upon the large and very important question of the future of electric lighting in London; and you refer especially to two questions of principle which have arisen in relation to the matter—viz., (1) What should be the extent and nature of the area to be granted; and (2) should or should not concurrent powers be granted to two or more companies within the same area? The Council has also considered the further letter from the Board of Trade, dated May 18, forwarding copies of a report by Major Marindin, R.E., on the result of his inquiry into the applications for Provisional Orders and Licences under the Electric Lighting Acts, 1882 and 1888, as well as into the subject-matter of the Bill introduced into the House of Commons by the Metropolitan Electric Supply Company.

The Council has directed me to submit the following suggestions and observations for the consideration of the Board of Trade when dealing with the electric lighting schemes affecting the County of London:—

The Council agrees that extensive areas may properly be granted to companies when their financial and technical means of carrying out the powers intrusted to them are of a satisfactory character, and accepts generally the recommendations of the report as regards the districts to be allotted to the several companies.

The Council considers that, in the interests of the public, competition is desirable under proper restrictions.

The Council is not prepared to offer any opinion or suggestion with reference to the scientific or technical portion of the report, but desires to express its full concurrence with the recommendation in Major Marindin's report, that a company supplying a large area without a reserve of current should be required to provide duplicate sets of generating machinery in separate buildings, and duplicate sets of mains, in order to secure a proper and continuous supply in case of a breakdown of machinery or other default; and, further, that every possible means should be taken for guarding against danger to the public from currents of high tension.

The Council concurs in Major Marindin's suggestion (2) that certain streets should be scheduled in each district for the compulsory laying of mains, and that the supply in the remainder of the area should be made compulsory, upon requisition of consumers, on fair and reasonable conditions; and suggests that, in case of such supply not being afforded after a sufficient interval of time, the Order should be revoked as regards the whole of the parish or district in which such default occurs. It appears to the Council that, without such a provision being made, a company might be in a position to supply those parts of a parish or district where there was a good demand, and to leave unsupplied those parts of the area in which the demand was limited. The Council further suggests that the companies should be required, in all streets where mains are laid, to bring the supply at their own cost to the consumer's premises.

The Council concurs in the suggestion (6) in Major Marindin's report that, wherever a company now supplying a district by means of overhead wires is granted an Order for such area, the company should be placed under statutory obligation to remove these overhead wires within two years from the granting of the Order; and that, if possible, such company should be prevented from invading a district in which it has no statutory powers by means of overhead wires. And the Council suggests that it should be an indispensable condition of the granting of any application for an Order or Licence that, in the area referred to therein, all wires and mains should be laid underground.

With reference to clause 55 of the London Company's Order, which would enable the Company to supply electricity to a vestry or district board for the latter to retail to consumers, the Council considers the expediency of granting such a power to be doubtful, and would suggest that, if allowed, a provision should be inserted that the power given by the clause shall in no case be acted upon without the consent of the Council having been first obtained.

The Council also submits the following general suggestions applicable to all the Orders and Licences, namely—

(*a*) That the terms and conditions of all Orders or Licences granted should be as nearly as possible identical.

(*b*) That companies should be required not only to make use, with the consent of the Council, of subways now made, or which may hereafter be constructed, in streets where mains are to be laid, but to pay a fair rent for such use; and, further, that in case of subways being in future made in streets where wires are already laid, the companies should be under an obligation to remove the wires into such subways and to pay a rent for the use of them—a reasonable time (say three years) free of rent being allowed as a set-off to the cost of such removal; that the power to make subways in the London streets should be vested in the Council, and not in the local authorities of the several districts.

(*c*) That provision should be made to prevent the opening of any thoroughfare in the County of London for the purpose of laying mains, &c., until the consent in writing of the Council shall have been given to such opening.

(*d*) That provision should be made for exempting the Council and the vestries and district boards from liability in respect of any damage which may be done to mains, &c., in carrying out works of repairs or improvement in streets or roads, or from the use of steam-rollers in the execution of such works.

(*e*) That provision should be made for preventing interference with main or local sewers, or with the proper access to them, without the consent of the authorities in which such sewers are vested; and that plans of works which would interfere with sewers in any way should be submitted for the approval of such authorities before the works are begun.

(*f*) That, in view of the future possible reduction in the cost of production which may be made as the result of experience and invention, there should be a provision that the maximum price of 8d. per Board of Trade unit proposed to be adopted shall be subject to revision at the end of seven years; and that, in order to insure healthy competition between the companies during that period, (1) no amalgamation or working agreement between companies should be permitted without the consent of the Council, and (2) power should be given to the Council, at the request of a vestry or district board, or on the requisition of inhabitants in any street or district, and with the consent of the company interested, to extend the area of such company to such street or district without the necessity of obtaining another Order. That clauses should be inserted providing for the application at the end of the seven years of a sliding scale of price and dividend, on the basis of a dividend of 8 per cent.; leaving the initial price and arrangement of the scale to be determined at the expiration of the term of seven years. That provision should be made that electricity supplied to local authorities for the purpose of public lighting shall be charged for at a less price than that charged to private consumers. That the minimum charge for supply should be fixed as low as possible; and that should such minimum be fixed at £1 per quarter or over, it should be reckoned by the year and not by the quarter, because of the irregular requirements of consumers at different seasons of the year.

(*g*) That, for the purposes of purchase by a public authority, any additions made to the area of supply of any company shall be taken to be part of the original area granted to such company, and that the powers over the additional area shall terminate at the same time as those over the original area, unless at the time the additional powers are granted to the company it shall be expressly stated to the contrary. The Council considers it would be to the advantage alike of the public and the companies that there should be one uniform system of regulation and control throughout the entire area of London. The necessity of this was forcibly illustrated by the very varied, and in many respects inconsistent, objections and requirements of the different vestries and district boards in regard to the proposed Orders and by the complication and difficulty occasioned thereby.

The Council is of opinion that, as the representative governing body of the County of London, it should be appointed the controlling authority. It would always give the fullest consideration to the representations of any local body on questions affecting its particular interests. The Board of Trade may be reminded that the main roads throughout the Metropolis will shortly come under the jurisdiction of the Council, and should any general system of subways be hereafter resolved upon, such system will also be under its control. The Council considers also that it should be the authority to whom should be given the power of purchase in all cases at the expiration of the specified period. It would be manifestly impossible for any single vestry or district board to purchase a large undertaking supplying many parishes, such as that of the London or the Metropolitan Company. The Council would further suggest that if it is made the controlling authority it should be empowered to discharge the following duties, viz.:—Inspection of lines and works; testing current; testing and certifying meters; taking proceedings for imposition of penalties or forfeiture in cases of default as provided in the Orders; and, in order to carry out the work of testing, it should be made obligatory on the companies to provide and maintain a sufficient number of testing-stations, and proper and efficient testing apparatus.

The Council, in view of the fact that some companies have been and are now supplying electricity by overhead wires, without statutory powers, and being convinced of the undesirability of allowing this to be continued, would venture to suggest that, in any future legislation on electric lighting, the supply of electricity in any district before statutory powers have been obtained for such district should be prohibited under penalty.

The Council, in submitting the above suggestions, is animated by a desire to facilitate the working of the companies' undertakings in the various areas to be allotted to them, and at the same time to insure that the interests of the public are properly guarded.

Some of the Orders will affect the bridges, embankments, and other works under the jurisdiction of the Council, and the Council reserves any expression of opinion upon the manner in which its interests should be protected, as also upon other general matters of detail, until it shall have received the copy of the Model Order referred to in the letter from the Board of Trade of the 18th of May.

Alderman HAGGIS, in proposing that the foregoing letter be approved, and sent to the Board of Trade, said that in March last a letter was addressed to their Chairman (Lord Rosebery) by the Board, in which it was intimated that in all probability the Council would before long have the powers vested in them which were now exercised by the Board of Trade in respect of electric lighting. This being the case, the Board wished to know the opinions of the Council in respect to the many schemes that had come before them for electric lighting in London. The Committee had considered the matter in a very comprehensive spirit. The first question asked by the Board of Trade was as to the extension of areas which should be allowed to any one company. In the applications at present before them, there were two companies that desired very large areas; and the Committee had come to the conclusion that, so long as a company had the financial power and ability to carry out its works, they would recommend that a large area of supply should in such a case be allowed. Then they were asked a question as to whether they would let more than one company supply one district, and so allow competition. To this the Committee replied that they thought it was desirable, under proper and reasonable restrictions, that competition should be permitted. The Act of Parliament of last year clearly showed that Parliament would not recognize a monopoly by any one company of a district, because in one of the clauses of the Act, it was clearly stated that the permission to a company to occupy an area should not prevent another company obtaining sanction to go into the same area afterwards. The question as to the allocation of areas by the various companies had been considered in the inquiry before Major Marindin; and one could not be surprised that some dissatisfaction had arisen as to the allocation of areas which Major Marindin recommended. Some of the companies felt aggrieved that they had been shut out from profitable districts; and one company especially complained that, for certain reasons, they were not allowed to enter any district at all. The Committee had thought that it would not be wise for the Council to interpose in the matter of the allocation of areas at all. They thought that, as Major Marindin had devoted so much time to his inquiry, and to the consideration of all the points brought before him, that it would not be right that they should step in and suggest any alterations in the course which he recommended. As to the question of overhead wires, they felt that it was of the utmost importance that no overhead wires should be allowed in large areas, and that they should be prohibited by statute. At the present time the law with regard to this question was in a very unsatisfactory condition. There was no real law at all on the matter; and certain companies had placed their wires overhead without any reference to public rights. By and by he hoped that the Highways Committee might be able to bring up some definite recommendation with regard to wires above ground. Major Marindin suggested that, where companies were now working with overhead wires, when they obtained statutory powers, they should place their cables underground; and that, within two years, they should remove the overhead wires with which they were now working. To this the Committee agreed. It was most unfortunate for London that there was no thorough system of subways in the streets—some four miles being all in existence. It was a question whether it would not be desirable, in the interest of the public, for the Council to consider the question of subways in regard to the main streets of London generally. They thought it might be possible for the Council to construct subways which they could compel the various companies to use. At the present time they were allowing the companies to use the subways free. They now proposed that, in the different Provisional Orders granted, a clause should be inserted which should compel the companies, not only to use the subways which now existed, but also to place their mains in any new subways that the Council might construct. As this might entail considerable expense upon the companies, the Committee suggested that for a certain period they should be granted the free use of the mains, and that afterwards they should pay for such use. Then there came the important question of price. The Board of Trade had proposed that the maximum price to be charged for electricity should be 8d. per Board of Trade unit; and to this the Committee agreed. It was suggested that, after seven years, the question of price should be reconsidered, and that a sliding scale should be introduced, the same as in the case of the gas companies. It might be asked why was not a sliding scale introduced at once, instead of after an interval of seven years. The reason was very apparent. If a sliding scale was introduced now, the initial price would have to be fixed; and as in all probability during seven years' experience it would be found that electricity could be produced much cheaper than at present, it would not be right to fix the initial price now, as in that case the companies would obtain the benefit of any cheapening in production that might arise. They felt that during the seven years the companies should have an entirely free hand, and that there should be the most healthy competition possible amongst them. In order to produce competition, they suggested that no amalgamation or any working agreement should be allowed between the companies during the seven years, without the consent of the Council having been first procured. They further suggested that if one company could supply electricity better than another, and could supply it cheaper, and if the inhabitants of any particular district asked them to come into their district, they would be able to allow such a thing without having to go for another Provisional Order. They felt that such a course would put the companies on their mettle. If such a power were placed in the hands of the Council, it would greatly facilitate the cheapening of the light for the public. Then with respect to the question of price and dividend. The Board of Trade suggested 10 per cent.; but his Committee thought it was too high. In the case of the gas companies the dividend was fixed some years ago at 10 per cent., when money was not quite so cheap as it was at the present time; and 8 per cent. now would be fairly proportionate to what 10 per cent. was in those days. They therefore thought that 8 per cent. should be the basis upon which the sliding scale should be fixed. It was important to remember that, according to the Act of Parliament, in 42 years they would have the right to purchase the property of the companies without giving a single penny for their goodwill; and therefore they should not be too hard in the conditions which they imposed upon them now. The gas companies were not under that regulation at all. With respect to a guarantee, they considered the companies should have a guarantee from everyone who applied for the light; and the minimum charge in this respect, they suggested should be £5 a year. They also thought that the Council should be the controlling authority in regard to these electric lighting schemes. It would be a most unfortunate thing for the development of these companies if they were subject to various authorities all over London; and it was very desirable that one central authority should have the right to control their affairs. They therefore asked that they should be that authority as representing the whole of London. They also wished for powers to inspect the mains and works of the companies, as well as the current and the meters. They also ought to have powers to enforce any penalties or forfeiture in case of default. They desired to see the enterprise prosper; but still it was their duty to safeguard the interests of the public, and they therefore asked the Council to approve the recommendations the Committee had made.

Mr. C. L. LEWES remarked that there were several grammatical errors in the letter, which, he thought, ought to be rectified before it was sent to the Board of Trade. He considered that the following paragraph might very well be omitted:—"The Council, in submitting the above suggestions, is animated by a desire to facilitate the working of the companies' undertakings in the various areas to be allotted to them, and at the same time to insure that the interests of the public are properly guarded." Then the Board of Trade had asked for the observations of the Council on the matter; and therefore he thought it would be advisable to say that the suggestions contained in the letter were the only remarks they intended to make.

Mr. H. CLARKE said he would like to ask the Chairman of the Committee a question with regard to the following words in the proposed letter:—"The Council is of opinion that, as the representative governing body of the whole of London, it should be appointed the controlling authority." Had the Committee ignored the fact that the Commissioners of Sewers were the local authority according to law for the City?

Mr. D. H. MACFARLANE said that, whatever the Council did, they should be careful not to create a monster with the electric lighting companies as was the case with the gas companies. It was suggested that at the end of seven years a sliding scale of price, and an 8 per cent. dividend, were to be introduced. He should like to know whether the maximum had been fixed at which the public would have the right of purchase.

Mr. H. L. W. LAWSON, M.P., referring to the remarks of Mr. Lewes, said he thought it was undesirable that mere verbal alterations should be discussed by the Council. He would suggest that the Chairmen of Committees should submit their letters to the Chairman of the Council before bringing them up.

Mr. A. L. LEON asked if the Committee had taken into consideration the question of whether, if a company was one with a continuous current system, they would give them permission to occupy the same district that would be occupied by a company employing an alternate current system. With the latter, no accumulators could be charged; and unless there were double sets of engines and fires always kept going, there was the liability of a breakdown. With the continuous current they had accumulators; and he should like to know whether, if the letter to the Board of Trade was approved, the Council would be able to do what they liked in this respect. In regard to companies without a reserve of current providing duplicate sets of generating machinery in separate buildings, and duplicate sets of mains, considering that this would involve the doubling of the capital, he did not think it likely they would do it.

Mr. R. C. ANTROBUS said the Committee asked in the letter that there

should be no amalgamation or working agreement between the companies without the consent of the Council. He was glad to see this request; but he should be glad to see another Court of Appeal in the Board of Trade. He thought it would be only fair to the companies to have such a power of appeal.

Mr. T. G. Fardell remarked that, after the very lucid statement of Mr. Haggis, he did not intend to oppose the letter as a whole; but then he trusted the Council would not approve of the paragraph referring to the London Company's Order, which would enable them to supply electricity to a vestry or district board for the latter to retail to consumers.

Sir T. H. Farrar, Bart., said that unfortunately the Board of Trade were very anxious to have the letter from the Council, because without it they could not go on with the Order. If it were not for that it would be very desirable that the Council should have a longer opportunity of considering the matter. Although his knowledge of the matter was greater two or three years ago than it was now, he still remembered something of the trouble they had when Mr. Chamberlain's Act was passed. He knew enough to say that the letter had been prepared with the very greatest care; and he believed it met all, or nearly all, the points upon which the Board of Trade desired their observations. With reference to what had been said as to the terms of purchase, he believed that was provided for by the Act. Those terms the Council had nothing whatever to do with; and if he remembered aright, the terms did not depend upon the dividend paid or the price of the companies' shares on the Stock Exchange. The whole of the property was to be realized at the price at which it was put down; and upon those terms the purchase would be completed. He earnestly hoped the letter would be approved by the Council.

Other members having spoken,

Alderman Haggis, in reply, said that as to Mr. Clarke's question about the Commissioners of Sewers being the controlling authority for the City of London, that point could be met by substituting "County" for the City of London. With regard to the question of purchase, the Act distinctly said that they would not have to pay more than the value of the plant at the time of the purchase, and that they would not have to take into consideration either the goodwill or the amount of profit made by the company.

The motion was agreed to; and upon the suggestion of the Chairman, Alderman Haggis was empowered to make any verbal corrections that he might think necessary before sending it to the Board of Trade.

Board of Trade Inquiry.

(*Before Major* Marindin, C.M.G., R.E., *assisted by Captain* Cardew.)

Sixteenth Day—Monday, April 29.

Mr. Moulton, continuing his address, said it should not be thought that the Electrical Power Storeage Company simply desired to get a Provisional Order so as to make a traffic and then transfer it to others. They should ascertain really whether there was capital enough to work out the Order, and whether the undertakers could substantially carry out the work they proposed. About that there could be no doubt. It was a somewhat difficult matter; but the portion of the case of the utmost importance for the Board of Trade to decide was which was the best form of supply of the electric light. He quite admitted that they were in England almost at the beginning of public electric lighting. They commenced some time after he thought they should have done so; and the reason of the delay was not because there had been any recent discoveries in electricity which had seriously altered the problem, but because the legislation had stood in the way of its being carried out with any probability of commercial success until the difficulties had been removed. Otherwise the problems remained as in 1882, with the one exception that there had been added to the practical means of distributing electricity the transformer system—a system which, although then proposed, was not at that time known as an important element. But during the inquiry it had unquestionably been prominent. With that exception the public policy had not changed in any way from what it was in 1882. It was true that the new system extended the power of electric lighting. The aims and objects which led the Board of Trade to their conclusions in 1882 remained, however, of equal importance to what they then were. He would exemplify how the transformer system affected the previous Model Order, and see if it justified a relaxation, or whether it did not rather increase the importance of the carefully-studied obligations which were made incumbent on all the companies at the time. So far from justifying a departure from the prudent policy of that Order, its importance was only emphasized. Whilst the direct supply was almost beyond question the best system for the consumer, if it was to be effectively given to the public, all the obligations of the Model Order might be fairly insisted upon; and he thought they would be cheerfully borne by those companies who wished to do their duty to the public. But the transformer system differed from the direct supply in this—that the natural inducements to do the work thoroughly, and to make electric lighting the thing used from house to house, were absent; so that there was all the more reason that there should be statutory obligations to keep them up to their duty. That was shown in the case of the London Electric Supply Corporation, which seemed to be a Company which had seized on the one great feature of the transformer system, so that it would enable them to hold the City and prevent any competitor coming in; and it would do this without really giving to the public electric lighting in the best way. It was admitted in evidence that for motive power the direct supply was the only form of supply which was useful. It was also admitted that the Corporation could not supply electricity for motive power; and the Corporation witnesses stated that there was a demand for such a supply. The demand for gas as a source of motive power was getting more and more important. Electricity for motive power was free from the difficulties which attended gas—it could be given in large or small quantities; and could be used anywhere, from the parlour to the workshop; so that it had the opportunity of satisfying any desire that might exist or spring up of using motive power in domestic life, and in the hundreds of trades which were affected because they were so small that they could not afford to utilize the ordinary source of motive power. In America there had been continual working on the alternating motor; and Mr. King, who had had practical experience there, said that no satisfactory motor had been invented, although persons had been working at it for years. In choosing between the direct supply and the transformer systems, they would be choosing between one which was useful only for lighting and the other which was useful for every purpose for which electricity could be employed. By the direct system the storeage ensured the certainty of supply; and the value of that could not be insisted upon too forcibly. Perhaps the chief value of electricity was its instantaneous action. It responded at any moment to the demand upon it; and could be transferred through the ordinary means of carriage. But the danger to be feared was that a breakdown in the system might lead to immediate extinction. They had heard a great deal about the security against this; and it was said that they would switch on to another stream, or obtain another supply. That might be done very often; but it could not be invariably relied upon. A main or several mains might break down; and as this, of course, could not be foreseen, it could not be provided against. They had heard that the accidents that happened from the transformer system might leave the consumers in darkness. The direct supply, however, with the use of storeage, would prevent the possibility of immediate extinction. In many of the districts for which the Orders were sought to be obtained, there were a number of theatres and large assembly-rooms, in which were at times gathered great numbers of persons; so that an extinction would be not only of the utmost inconvenience but a possible source of danger. There was thus an almost necessary demand for storeage for use in theatres. If the supply were such that the individual could use storeage, then it might fairly be said that in places like theatres, where sudden extinction would be dangerous, the direct supply with storeage would especially meet the requirements, and be a great advantage. The transformer system was just as useless for that as for public storeage. It was impossible to use the transformer system for the purpose of storeage batteries. In America, where there were 120 installations, and where alone the transformer system had been carried out on a large scale, they found that they had never yet been successful with the high tensions. He should like to know what the London Electric Supply Corporation intended to do. Did they mean to work their alternating dynamos on the same circuit? No; although it would be an enormous advantage if they could do so, they were not audacious enough to say that even their most elaborate electrical machinery was of practical use in working into a network. The fact that that Company did not attempt to do it was sufficient to support him in saying that they could not rely on being able to work transformers into different parts of the same network. But with the direct supply it did not matter how large the network was; whether or not they were working with storeage; or where the generating stations were. They could fit into this network by the direct supply at as many points as they chose, and keep the pressure at what it ought to be; and they could ensure having a network depending upon a vast number of generating units, almost independent of the failure of each other. Let them look at the alternative on the other side. They must have small networks, many of them with all the complications that consequently arise, each one depending on a separate unit; or they must have large networks relying on gigantic machines, with all their disadvantages, and exposed to the danger of London being thrown into darkness when these gigantic machines fell out of gear. As to the public danger, the transformer system proposed to bring into every house electricity under circumstances dangerous to life and property. He admitted the value of the safeguards against this danger, and that they diminished it enormously; but still it was true that they brought into houses electricity under dangerous circumstances, and in a way in which he failed to see how they could prevent imprudence or carelessness from making that danger a very probable one. On the other hand, in the direct system electricity was only brought into the house under safe circumstances. Another point in his favour even more important, was that they did not use their high-tension electricity at the time they were using the low-tension electricity. In other words, at the time they were employing the low-tension electricity, so far as anything that had to do with the source of their low-tension electricity, there might just as well be no high-tension electricity. No battery could be on the charging circuit and on the discharging circuit at the same time; and the danger of the use of the high-tension current, apart from the question of the continuous current, was not to be put in any way on the same level as the danger of the transformer system. And besides, was there anything to show that the supply by the direct system was inferior; or had there been any suggestions that the supply in the alternating-transformer system was a better supply to the consumer than that of the direct system? He had not heard a single suggestion that the direct was inferior to the transformer supply in any point; and the evidence of experienced men pointed to an enormous advantage in superiority in the direct supply. If, then, the customer were better off with the direct supply than the alternating supply, why should he not get it? If the latter was not really cheaper, he did not see what there was to recommend it. If they contented themselves with moderate areas, there was no doubt that the direct supply was the cheaper. They had no figures to show what the transformer system would really cost, but nobody contended that for moderate areas it was cheaper than the direct supply. He would take the evidence of Mr. Siemens, called on behalf of the transformer system, who said that, provided the stations were not too large, and they could get a suitable site, he would prefer for London a system such as that used at Darmstadt, which he thought was the best. Then Sir William Thomson was equally frank, and said he preferred the direct supply and the storeage batteries, but only for small areas. Mr. Knight said that for straggling areas the transformer system was the best; but there was nothing which had yet been found in the use of the transformer system which contradicted the opinion that the direct supply was cheaper where they did not have straggling areas. The chief question was, Were they going to make the Companies keep to certain areas, or give them huge areas, and let them pick out from them just what parts they liked? With regard to the Metropolitan Company, he said that if they compared its capital with the area it was applying for, it was the most miserably poor Company that had come before the Board of Trade. Even the London Corporation, he thought, only asked for something like two-thirds of what the Metropolitan Company did; and it had a capital of about two-and-a-half times as much. The London Corporation were now asking for this large area; and what did they undertake to do in the way of work? Not a single yard of mains when they lodged their Order! They now, however, undertook to lay in Chelsea the same compulsory mains as the Chelsea Company took in 1886; but this was so that they might get their Order. Out of the 16 square miles for which they sought power, this was the only obligation they took on their shoulders; and they only took that upon themselves because they thought they had no chance of getting to Chelsea otherwise. Yet they asked for about 30 times as much area as his clients did. If these obligations were put upon the Corporation, where would their capital be? The enormous amount of plant they spoke of they admitted would be just enough for a quarter of million persons; but they never thought what capital would be necessary to light the area they had taken. In fact, if it came to the whole duty, the London Corporation would have to abandon half or three-quarters of its area before it could show it had money to do the rest. Another point was the capital allocated to do these areas. There, again, what had the London Corporation done? They had left that out entirely. They did not allocate a single sixpence to any portion of the district. The reason was obvious. They did not mean to supply London. They only meant to supply exceptional bits such as would prevent any other Company doing their leavings or competing with them in the bits they did. It would have been far the easier plan to have stuck to the Model Order of 1882; but the London Corporation had purposely omitted the several clauses which gave them the greatest difficulty, because they were fatal to their scheme. They intended to have roving powers over that area, but did not mean to confine themselves to any portion of it. Thus they found that the Corporation came with a capital wholly inadequate to do the duties it took on its shoulders; and if the Board of Trade gave it anything like the area it asked for, they would give it the opportunity of getting a large supply without it being a general supply throughout the whole of

its own district. The consequence would be that all the good places would be occupied by the Corporation; and the leavings would be for other Companies. But if this were permitted, where would other companies get the capital to do the rest? What this would lead to would be that London electric lighting would be in the hands of a company that might do it or not as it liked, but which would have a power irresistible of preventing it being done thoroughly by any other company. Appearing for Companies asking for small areas, which they were certainly capable of supplying, he trusted the Board of Trade, through Major Marindin, would report that the evidence before them established that the best and most efficient supply to the consumer was that of the direct system—that it was more useful; that it was safer; that, if they kept companies to comparatively small districts, they could get that supply as cheaply as they could get it by the transformer system; and that it was only through certain companies spreading their mains over a large area which they were not going to do thoroughly, that the cheapness of the transformer system could come in. In other words, if they were going to do the district thoroughly, the direct supply was cheaper; but if they were only to do bits, then the advantages of the transformer system came out. Turning to the question of competition, was there anything, he asked, that had been brought forward at that inquiry which would justify the Board of Trade in coming to a different conclusion from that which it came to in 1882—viz., that potential competition and judicious districting were better for the public than competition in the same area. He ventured to think there was nothing whatever. The third thing the Board of Trade relied on so much was the competition of gas. Was there any reason to think that that was less efficient now than in 1882? If they took what gas could do in 1882 and what gas could do now, the competition of gas was immensely more dangerous. The Gas Companies were now awakened up from their lethargy. There had been improvements made in gas-lamps; there had been a greater use of gas as a motive power; and certainly gas was a far more dangerous enemy, and a far greater and more competent rival to electric light, than it was in 1882, if they came to consider the prices they were asking to be allowed for electric light—that was, about 8d. per unit, or 2s. per 1000 candles. Gas was now about 2s. 6d. per 1000 cubic feet; and a cubic foot of gas in the best lamps was, he believed, made to give about 6 candles. So that they saw, so far as light against light was concerned, gas, now that it had awakened up and was doing its best, was a much more formidable competitor as far as cheapness went than it was in 1882. Mineral oil was a much more efficient rival in respect to gas than it was in 1882. The better refinement of oil, the use of lamps being even better understood now than it was then, and better forms of lamps having been invented, made it a much more serious rival in the case of persons who could not endure gas in their houses. Therefore he said that the rivalry which the electric light had to overcome, partly by cheapness and partly by efficiency, and partly by its own inherent very great advantages, were more formidable than ever. Nothing brought forward during the inquiry would lead the Board of Trade to believe they were not right in coming to the conclusion that competition was not a good thing for the public, and to induce them to abandon that at the present time. As to the proposed charge of the Corporation, he believed their minimum was higher than any other Company's. They did not intend to supply less than 15 units. For any quantity up to 15 units, they charged £5 per quarter. The consequence was that, unless they took the valuation of £5 a quarter, in any case they would have to pay up to £5 a quarter. It did not look as if they were going to do any very small lighting at all. That was higher than any of the other Companies whose charge of 6s. 8d. per unit came to 8d. per Board of Trade unit. So that they did not show any willingness to do it for anything less than the others offered to do it at. The question of a minimum was very important.

Mr. PEMBER: Would you mind telling me what your Chelsea unit is if ours is 8d.

Mr. MOULTON replied that authorized by the Act—that was 10d.; but that was under the 1882 Act. That which they now asked for in their Order was 8d.; and, of course, as regarded the 10d. unit, it was not proposed for a single moment to charge up to it—their charge being 8d. In all the Orders that were before them it was 8d.; but it showed with regard to the minimum that they were even afraid of being kept to 8d. for small lighting, so that there was not the slightest evidence that they meant to charge less. It was admitted that it was best to have a small generating unit, and that that was the most economical form in which they could get their power; but, instead of adhering to this principle, the London Corporation took a unit of a gigantic size. The reason for that he could not tell, unless they expected to be able to deal with the electric lighting in distinct batches, and did not expect to have the ordinary task put upon them. Why they should come before the Inspector and put before him as candidates for these large powers a system which was experimental from one end to the other if there were not some reason of that kind, he could not understand. It began with a generating unit of 10,000-horse power, which was enough for 10,000 lamps. The Company also admitted that their dynamo would be twenty times larger than any dynamo ever employed before; and that the voltage would be ten times more than that used in America, and four times more than that used in England. This scheme if it broke down would discredit electric lighting. It was admitted to be experimental from beginning to end; and that the experiment would be tried on a scale which would endanger human life and property if the safeguards which were relied upon should turn out defective. Altogether they were asking for privileges, without undertaking to do the thing more cheaply, and with the admission, practically, that they would do it more inefficiently, and that the public would be at their mercy. The system he supported was one that had been tried with success, and had given a good supply at a reasonable price. As to the particular localities to which his Order referred, he would first take the Chelsea Order. His Company obtained an Order under the 1882 Act in 1886. For the first two years they did nothing; but when the 1888 Act was passed, they at once procured their capital. They obtained an Order which obliged them to work certain portions of Chelsea, putting down mains throughout, and every one of the mains had been laid down. The supply of light was sufficient for all who wished to be supplied. Under these circumstances what happened? The Grosvenor Gallery Company, which was not under a Provisional Order, came in, and was permitted to remain. This, he thought, was an instance of the short-sighted greediness which distinguished some of the local authorities. Why should a Company under these circumstances—doing a remunerative work, and putting down the necessary mains—be subjected to competition of that kind at the request of the local authority? The Chelsea Company not only did what they undertook to do; but more, and even under these circumstances, the London Corporation now took up the obligations of the Grosvenor Gallery Company, and applied for permission, and undertook to put down mains in the same streets in which the Chelsea Company had laid theirs. Could they have anything more to show the wastefulness of competition and the greediness of certain companies? If they were endeavouring to do the best for their districts, they would try and extend the electric lighting; but they must go and put down, side by side with every main of the Chelsea Company, another main, although he did not suppose there were 50—certainly not 100—houses in the district ready to take the electric light. If such were the spirit that animated local authorities, the public would soon find that they would be very much injured instead of being benefited. The Board of Trade should refuse to allow the London Corporation to come into this area until they had some evidence that the Chelsea Company were not doing their work. The Chelsea Company also asked for a portion of Kensington, and a part of Belgravia. With regard to Kensington, the Vestry had given his Company a very small portion of the district, which they could work with the greatest ease from their generating station. Although the Vestry had not given them all they asked for, they were quite satisfied to take exactly what they gave them. There were several alterations suggested by the Vestry, but he believed they were fully considered in 1882; and he doubted very much if it would be thought necessary to alter the terms of the Provisional Order. Coming to Belgravia, the Company applied for a district which was very well situated with regard to their generating station and works. They proposed to lay mains through the whole of the area. His Company had the necessary capital for the work; and they had a district which would be naturally supplied from the generating station there. The district could not be better off in that respect. The local authority, however, objected, because they said the Company did not undertake to do the whole of the parish. But the parish boundaries, he contended, were not what they should be guided by in that area for the districts were quite distinct; and he could not think the Board of Trade would be justified in saying that there was any sufficient reason why the Company should be refused their Order. Mr. Moulton then dealt with the Electrical Power Storeage Company, and said the parts they applied for were Paddington, and St. Martin's-in-the-Fields, in the Strand. As to Paddington, he believed that the opposition of the Vestry—who, considering that they themselves should undertake to light Paddington—would not long be continued, and that the Company would soon get the assent of the Vestry to their proposals. The Company undertook to put down £30,000, which would thoroughly do the work they had undertaken; and they were willing to extend their works to other parts of the district. He therefore thought the Board of Trade ought to report this as a good scheme. With regard to St. Martin's-in-the-Fields, he believed they were the only one of all the competing Companies willing to undertake the obligation of compulsory works. This, he submitted, gave them the preference; and therefore the Order should be given to his clients. In the St. Martin's-in-the-Fields district, they had the strong opposition of the local authorities there. The Strand district was thickly studded with theatres and assembly-rooms; and the Board of Trade could not say that the general supply of an alternating character was suitable for the public wants in such a district. The supply ought to be one that could be relied upon. The importance of the electric light in the theatres was admitted, because not only was it advantageous to the people who frequented the theatres, but it lessened the danger of fire. For the Strand, he thought, the only application that should receive the sanction of the Board of Trade was that of the Electrical Power Storeage Company, which gave a direct supply. The more he looked at the position and system of the London Electric Supply Corporation, the more he thought it an attempt to hold London without lighting it. The difference between the two types of electric lighting was like the difference between a set of colonists and an army of occupation. What was sought by the London Corporation was to occupy London with a system only half developed and experimental. It showed him that they appreciated being first in the field. Not only was the system experimental, but even the methods of doing it had not been thought out. The only meaning was that they wanted to have a huge corporation to hold London for electric light; and their cry of "no monopoly" was simply to cover an attempt to win a monopoly in the only way monopolies were won in England—viz., by getting legislative privileges embodied in and exercised by the powers of a huge corporation which, by command of the field and capital, would be able to deter or terrify anybody else from entering into serious competition with them. If those privileges were granted, and London surrendered to the Corporation under their terms, what he felt was that electric lighting in the Metropolis would be at the suffrage not of the Legislature, but of the London Corporation.

Mr. C. A. CRIPPS, for the Metropolitan Electric Supply Company, then followed with his reply. With reference to the arguments of Mr. Moulton in favour of districting as against competition, those arguments were, the learned Counsel said, based upon false assumptions. It was urged that the question of districting *versus* competition was settled once for all by the Board of Trade in 1882; but the subsequent history of the question showed that there had been no final settlement of the matter in that year. It was suggested that in the Metropolitan Order the plums had been picked out; but that was not so. In fact, the Chelsea Company, which made the suggestion, was the very Company which under their compulsory area system had picked out the plums which they said the Metropolitan would do if they had the opportunity. But the Metropolitan could be compelled to supply any part of the district under a form of requisition; and they really desired to place the whole of it on precisely the same footing. The question of districting as against competition, occurred in nearly every area; and the attitude taken up by the Board of Trade in 1889 was shown from the following clause which they approved:—"It must be remembered that whilst on the one hand it is important to prevent the public from suffering the evils which they suffered from the perpetual monopolies granted to gas and water companies, it is, on the other hand, no less important to offer such inducements to solvent and prudent investors as may induce them to invest capital in this novel undertaking." The only class of investors which the Inspector now had before him were the shareholders who had invested in the Metropolitan Company or the London Corporation. There had been a great advance in the science of electricity since 1882, in which year the Board of Trade gave a limited monopoly on the ground that the science at that time was in an experimental condition, and that it was necessary to give special terms on that very basis. But now the period of experiment had passed away; and the period of certainty in electricity as a science had taken its place. Of course, there were minor difficulties, but they were certain to be overcome; and no one could have attended the inquiry without having arrived at the conclusion that very great progress had been made in the science since 1882. That the question of districting was not settled in one way or the other in that year, was shown by the letter of the Board of Trade to Lord Rosebery in reference to this very question. It was, in fact, one of the crucial points which had to be decided. That letter contained the following:—"In dealing with these applications, the Board of Trade are at once confronted with two important questions of principle—1. What should be the extent and nature of the area to be granted? 2. Should or should not concurrent powers be granted to two or more companies within the same area." Those were the very points upon which Mr. Moulton had laid so much stress, as if they had been finally settled. Then the letter also stated: "As regards the former, many considerations must be taken into account—*e.g.*, What is the financial position of the undertakers applying for statutory powers in any given area; how far any one company would be in a position satisfactorily to supply such

an area; and in connection with this much would depend on what distance electrical energy for electric lighting purposes can be safely and conveniently furnished from a central station." The Company which he represented had a total population in their area of 900,000 persons; and they had already made provision for £350,000, which would go a very long way to supplying the whole demand they expected. There was no doubt whatever that financially their Company was sound, and fully able to carry out all the obligations of their area under the Order. They had made arrangements by their generating station for any immediate supply that might be expected; and there would be no difficulty whatever in increasing the number of generating stations so soon and so far as a further supply was needed. Their system could be relied upon both in regard to the supply and safety. As to whether concurrent powers should be granted to two or more companies, he did not think it necessary for the Board of Trade to lay down one overbearing principle to apply to every district, whether or not local authorities desired it. Of course, they should consider the views of the local authority in each given locality. Where they asked for competition, and the Companies were willing to give it, it should be allowed. The Metropolitan Company were quite ready to go anywhere as a competing Company, because they believed their finances were absolutely sound and their position was the best; but they did not desire to override the wishes of the local authorities. The capital of the Company was actually subscribed; whereas as to capital the Chelsea Company were in by no means a good position. As to the Electrical Power Storeage Company, he desired to point out that they were not the real promoters of the Order for which they were asking the sanction of the Board of Trade. Being a manufacturing Company, they had no intention of carrying out the Order; and they said themselves that if it were granted, they were prepared to deal with it either with or without consideration. But it was contrary to precedent to grant any powers to a company in such a position as that. Immediately they became a statutory Company under a confirmatory order, they were debarred from transferring their rights without a further Act of Parliament. The promoter of this Order should be a genuine one in the interests of the Metropolis; and that, he maintained, could not be said of the Electrical Power Storeage Company. The Strand District Board would not have anything to do with them, as they did not look upon them as a *bonâ fide* Company for lighting the district, but simply as a manufacturing Company desiring to benefit itself by means of another company. By section 1 of the Act of 1888, the wishes of the local authority must be considered; and the Metropolitan Company had special reasons for paying attention to that section, because last year when they were seeking Provisional Orders from the Board of Trade, they were not allowed to proceed with a single Order, unless they had the consent of the local authority. So far as Paddington was concerned, they were a dissentient authority; and the Metropolitan Company must bear the burden of that section of the Act of 1888. However, if the Inspector thought there was no reason why they should have powers against the consent of the local authority, they could not press the Order; but he (Mr. Cripps) would leave it to the Board of Trade to say what the real nature of that dissent of the local authority was.

Major MARINDIN: They passed a decided resolution to oppose all Provisional Orders and Licences.

Mr. CRIPPS said he could not help thinking the actual resolution should be placed on the notes. As to Marylebone, he said they had an Order arranged with the consent of the local authority; and their only competitors were the London Company, who were applying for only the southern or better portion of the district. Upon the question of price, he first thought there was no difference in that which had been arranged in the Orders, and that which the Company were prepared to give to the Marylebone district. But he found in one case the minimum was 15 units, and in the other two units; whereas in the one case the small consumer could not get the benefit of the lighting, in the other he could. Dealing next with the South London Order of the Company, Mr. Cripps said there was no opposition; and Lambeth preferred the Metropolitan to the London Company, because the Metropolitan applied for power to light the whole district, whereas the London only picked out a quarter, and that the best portion. But there were certain conditions—and if insisted upon, he thought they could not be agreed to—which the Lambeth Vestry wished to insert in the Order. One was with reference to the obligation to light certain main streets, and practically the whole length was about 34 miles; and he did not think the Company would get a penny out of that.

Major MARINDIN: You refer to the compulsory laying of mains through certain streets?

Mr. CRIPPS: Yes. The Vestry also, he proceeded, wanted a strong clause as to overhead wires; but that was a matter for the Board of Trade. The Company could meet the objections of the Lambeth Vestry except in regard to the 34 miles of streets. Otherwise the Vestry was a dissenting body; and the Company must take its chance.

The inquiry was again adjourned.

REDUCTIONS IN PRICE.—The Directors of the *Reading Gas Company* have announced a reduction in price of 3d.; making the charge 2s. 9d. per 1000 cubic feet.——From the taking of the indices for the present quarter, the *Portsea Island Gaslight Company* have resolved to charge their customers 2s. 4d. per 1000 cubic feet; being a rebate of 2d. on the existing price.

ALEXANDRIA WATER COMPANY.—At the ordinary meeting of this Company, held at Alexandria last Thursday, a dividend was declared at the rate of 6¼ per cent., or 6s. 6d. per £5 share, and £1 6s. per £20 share, upon the capital of the Company to March 31, 1889, free of income-tax; making, with the interim dividend of 2½ per cent., or 10s. per £20 share, declared Nov. 14, a final dividend of 9 per cent. for the financial year.

NORTHERN COAL TRADE.—There has been a good demand for coal during the past few days; but the holidays have interfered with the supply, and local holidays will again do so in a fortnight, so that the production will be well taken up. The price of best Northumbrian coal is about 9s. 6d.; but as an advance of wages is now a mere question of time, it is expected that a higher price must rule. Small steam coal is scarce, at 4s. to 4s. 3d. For gas coal there is a growing demand; and though the shipments to London have been rather lower during the past few months, there are signs that heavier shipments will take place in a fortnight. The Durham miners have asked for an advance of 20 per cent. in wages; and though it is improbable that this will be fully granted, yet some advance will be given, possibly 10 per cent. Thus with dearer mining timber, the gas coal of Durham must be expected to be higher during the remainder of the year. Some large gas coal contracts are now in the market. The price generally given ranges between 7s. 6d. and 8s. 6d. per ton, free on board in the Tyne or Wear. Some rather heavy shipments of coal are being made from West Hartlepool. House hold coal is generally dull. At present there is a keen demand for gas coke; and at Stockton the price has been raised to 10s. per ton.

THE BIRMINGHAM GAS COMMITTEE AND CORPORATION TRADING.

THE COMMITTEE'S REPORT BEFORE THE COUNCIL.

At the Monthly Meeting of the Birmingham City Council last Tuesday—the MAYOR (Alderman Barrow) presiding—the report of the Gas Committee on the question of trading by the Corporation in gas-fittings was brought forward for approval. A summary of the document was given in the JOURNAL last week, p. 1052.

Alderman POLLACK, in moving the adoption of the report, said that the deputation of gas-fitters which met the Finance Sub-Committee were very reluctant to enter into particulars of their grievances, and preferred to rely upon the broad principle that the Corporation had no right to deal in gas-fittings, because that interfered with the trade of some of the ratepayers. The Committee, however, could not be charged with innovation; but they would have been guilty of reckless innovation if they had proposed to abandon or abolish a department for which the Corporation had paid a heavy price, and the principles underlying which had been repeatedly affirmed both in the Council and in Parliament. The statement that no other corporations undertook gas-fitting was certainly erroneous. The complaint that the competition of the Gas Committee was increasing had been shown to be absolutely unfounded. Much had been said about contract work; but it would be seen that this formed an inconsiderable item of the whole turnover, and was not last year more than 8 per cent. It was then said that the prices at which the department undertook work defied competition. The Council would be able to judge of the justice of that allegation by observing the number of unsuccessful tenders which the department had made during the last three years. The figures also disposed of the statement that the Gas-Fittings Department did three-fourths of the trade—a statement which showed the exaggerated notion which the deputation had of the whole business. Moreover, it was untrue that the department did not realize a profit. Although last year the net profits were below the average of the past thirteen years, they amounted to £1121, or more than 11 per cent. on a capital, which was rather below than above £10,000. On the average of thirteen years it had been 15 per cent.; and if, instead of making a profit in 1887, they made a loss of £249, the fact had not been concealed, and was due to insufficient profit on the illuminations in connection with the Queen's visit, and to several explosions, one of which alone caused a loss of more than £450. The fitter whose ignorance caused the explosion left during the investigation, but was amongst the memorialists. (Laughter.) The theory that corporations should not embark in trade was regarded as a sound one. But the value of theories depended on their application; and as to this case, it must be remembered that the Corporation had acquired a valuable plant, and were answerable for its success, which meant not only providing good gas at a moderate price, but finding interest on capital, accumulating a large sinking fund, and realizing a profit in aid of the rates. To be successful, the Gas Committee must have every opportunity of demonstrating the efficient use of gas, and of placing within reach of the ratepayers the best apparatus. When, moreover, the gas-works were purchased, the Fittings Department was part and parcel of the bargain. To give it up now, at the bidding of a one-sided agitation, would be like cutting off a limb from a sound body. The question was one of the means of existence to the workmen of the department; and these latter had handed in the following memorial:—"We, the undersigned journeymen gas-fitters and ratepayers now in the employment of the City Gas Department, have read with feelings of indignation the false and erroneous statements lately published in certain newspapers; and we have no doubt your Committee will be able to deal with them in the manner they deserve, at the proper time. We have read that there are about forty men, all told, connected with the Fittings Department; Mr. Dowler Green's assertion, 'I think that the men are anything but satisfied, and did they dare to complain they would;' and Mr. Parkes's statement that when we have a job not under contract we have heaps of material left, and then we use it for other jobs which are contract. Now, Sir, we, the undersigned fitters, voluntarily, of our own free will, most emphatically protest against and deny such malicious, libellous statements, made against us as a body; and although there are some trivial matters of detail that we should be glad to see altered, still on the whole we have no ground for complaint against the present management; and we are pleased to think that there is such a department, who keep the trade up to a state of efficiency." This document was signed by 53 of the men. The department, Alderman Pollack proceeded, manufactured none of the goods it sold, enjoyed no monopoly, and was at greater expense in proportion to turnover than private traders. The 60,000 meters distributed over the area of supply were, he said, the property of the Corporation; and it would be improvident and injudicious to allow any private fitter to connect the meters with the services or the services with the mains; and for this purpose alone the Fittings Department would be indispensable. Its advantages to the ratepayers were obvious; and, finally, it was for the Council to decide whether, by discontinuing the department, they would impede the progress and legitimate activity of the Gas Committee, whether they were willing to disregard the convenience and the interests of the 55,000 customers on their books, and whether they were prepared to discharge more than 100 workmen now in their employ.

The motion having been seconded,

Mr. LOWE moved the following amendment:—"That the report of the Committee be approved except that portion of it relating to the Fittings Department, which is hereby referred back to them to consider the possibility of discontinuing the general trade in gas-fittings, and at the same time making such special regulations or exceptions with regard to the authorization of fitters, the laying of private services, supply and control of gas-meters, and the supply or hiring of gas-stoves, as may be deemed necessary for the protection and convenience of the public." At the outset, he charged the Committee with having shown a want of generosity, fairness, and candour in their report. The views stated in the memorial, he said, must alone be taken as expressing the case for the private traders. The Committee, however, seemed to have inveigled some of them at short notice into an interview, and taken advantage of their unprepared condition to entrap them, with lawyer-like astuteness, into making admissions which might be used against them. Did ever anybody hear a more astounding doctrine enunciated in a free country and a Radical town, than that the principle of corporation trading had been approved thrice by the Council and twice by the Imperial Parliament? As to other towns, amongst the twenty-eight which the Committee said were at the present time engaging in the work of fitting, not one of any size or importance comparable with Birmingham engaged in a general trade in gas-fittings. He could readily understand that in a town where there was a lack of private enterprise, the Corporation might find it necessary to trade; but such a case did not exist in Birmingham. In Glasgow, Manchester, Salford, Edinburgh, Leeds, Belfast, Nottingham, Bradford, Oldham, Blackburn, Huddersfield, Middlesbrough, Halifax, and Darlington, where the gas undertakings were in the hands of the Corporations, there was no attempt to compete with private traders. By their report the Committee seemed to set them-

selves up as the only pioneers of progress and enlightenment; and to say in effect that, if they ceased trading, there would be an irreparable injury done to the department, owing to the incompetence of private traders. This was a most extravagant and absurd assumption. The Committee were insulting the traders by assuming that their fitters performed their work in an improper way. He could bring instances to show that the Corporation fitters made more blunders than those outside. The Gas-Fitters' Association did not limit their complaint to contract work, as stated in the report. They objected even more to the extensive non-contract work carried on. From the report he gathered that the whole of the turnover in the department was £22,000 per annum. This, divided between the 83 fitters, whose names appeared in the directory, meant a gross turnover of £253 a year each, or, estimating profits of 25 per cent., a profit of £62 10s. per annum each. He went on to argue at some length that the proportion of turnover profit realized by the department showed either extravagant departmental expenses or an unfair under-selling of the private traders. As an instance, he quoted £3873 as last year's turnover; and £1121 as the profit upon it. He had made his amendment as moderate as possible, so that the Committee could, if it was thought necessary, continue the sale of gas-stoves and the control of the connections with the mains. The present system, however, was wrong in principle, and injurious and indefensible in practice.

Mr. LANCASTER, in seconding the amendment, explained that the reason the memorial was not more largely signed was that other fitters were not then asked to sign it. He had, however, in his hands the signatures of fifty-one additional fitters. Some of the large makers had not signed for the obvious reason that they now supplied the Corporation. The returns of the last four years, he pointed out, showed an income of £755 5s. on a capital of £10,000; and surely that was not worth keeping up against the interests of 120 or 130 men. He could instance twenty cases where Corporation work was not satisfactorily done.

Mr. BEALE maintained that Mr. Lowe had not brought out any new arguments for consideration. The memorialists said that nothing short of absolute abolition of the system would satisfy them. Mr. Lowe declined to face entire abolition. He went in for a modification; but what then became of his principle? He (the speaker) denied that there was any want of fairness shown to the gas-fitters' deputation, or that the Committee had any intention of insulting private traders. The reason the profit to the department was small compared with the profit of private traders was that the latter did not keep expensive show-rooms and such a staff of clerks as was necessary for the Corporation. But the question of profit was not so important; it was only an incident in preventing loss. The question of general convenience was more weighty; but the greatest of all reasons for the system was its value to the gas undertaking generally.

Mr. BARCLAY contended that what was now done by the Fittings Department could be carried out as well by private traders.

Mr. JACOBS observed that, without being ungrateful to the Gas Committee, he could not help thinking that there must be something radically wrong in the management of the gas undertaking. He knew of no more unfortunate Committee than the Gas Committee. Including profits from chandeliers and all other sources, they only made a profit of 1 per cent.; and yet gas in Birmingham was dearer than in many other towns.

Mr. BRINSLEY said that, though he originally sympathized with the objections that Mr. Lowe had expressed, he had made full inquiry into the matter, and had come to the conclusion that for the general interests of the ratepayers it was a great advantage that the Committee should continue to do fitting work. They might injure the private gas-fitters a little; but they had their 50,000 customers to consider, and there was no Committee more anxious to serve the ratepayers than the Gas Committee.

Mr. GREEN urged that as the Council had approved the principle of corporation trading, and Parliament had endorsed it, it must be as right now as it was then. There were sixteen other corporations who did more or less fitting work at cost price, or without charge. This could not be alleged against the Birmingham department.

Alderman AVERY, speaking in support of the motion, reminded the Council that during the twelve years the Corporation had possessed the gas undertaking, the Committee, out of revenue, had paid off £352,000 of capital indebtedness. They had also rendered great assistance to other departments. The cost of public lighting had been reduced one-half, which meant placing £11,000 a year at the disposal of the Public Works Committee. Then the Gas Committee made contributions to the improvement fund, enabling the Council to make contributions to the improvement scheme to the extent of £25,000 per annum. This had not been done at the expense of the gas consumer; for the Committee had reduced the price of gas from 3s. to 2s. 4d., thereby making the consumers a present of £70,000 a year. With regard to the fittings branch of the business, its continuance was justified both by the profit balance, and by the general results upon the interests of the department. It might be prejudicial to those interests if they relinquished the control of this matter. Then there were 127 men employed; and how did they know that these would be able to get similar situations elsewhere if, from no fault of their own, they were dismissed from their lawful employment? The money of the ratepayers had been expended in the purchase of this, as well as of other parts of the gas undertaking. It would be contrary to sound principles to subsidize any particular trade at the expense of the ratepayers, which they would be doing if they sacrificed this business, for which they were still paying in gas annuities.

Mr. THOMAS observed that there was no foundation for the argument that the Fittings Department guaranteed excellence of workmanship.

Mr. WALSH said that he had hoped to be able to advocate the case of the gas-fitters, but on looking into the matter he was compelled to admit that the grievance seemed to be more the result of misconception than anything else. He had endeavoured to find a real case of hardship, but had not succeeded.

Mr. MANTON supported the Committee, remarking that the bulk of the memorialists were men who had entered into the gas-fitting business with their eyes open, and whose trade had really been created by the Companies whose responsibilities the ratepayers had taken over.

Mr. MARTINEAU said that Alderman Avery had reminded them of the benefits which the town had derived from the contributions of the Gas Committee; but the receipts from the Fittings Department would be but a drop in the bucket, and therefore it was not worth while retaining this department, especially when the principle was admitted by almost everyone, that the Council should trade as little as possible in opposition to private tradesmen. He suggested that arrangements should be made by the Gas Department to allow the gas-fitters of the town to exhibit their goods in the Corporation show-room.

Mr. BLOOR called attention to a grievance of the bricklayers employed at the Saltley works. The men complained that labourers were engaged to do bricklayers' work. They had had an interview with the Engineer (Mr. Henry Hack) who refused to redress the grievance, and told them he should not unless he were compelled by the Gas Committee.

Mr. OSLER said that his sympathies were with the gas-fitters, and therefore he regretted that he was unable to support the amendment. Gas was seriously threatened as an illuminating agent by electricity; and the Committee said that if deprived of the Fittings Department they would be seriously handicapped in maintaining and developing the sale of gas. In his opinion, this was not the time to place any disability on the Committee; and, consequently, he should vote in favour of the report.

Dr. BARRATT considered it immoral and unjust for the Gas Committee to interfere with private occupations.

Mr. WILDERS asserted that he had never read a more illogical, inconsistent, or inconsequential report than that presented by the Gas Committee. It looked as though it were drawn up by a special pleader rather than being a report which contained the concentrated wisdom of the Committee. He held that the principle of corporation trading was wrong; but thought it would be a good thing for the Gas Committee to continue the show-room, so that gas-fittings might be exhibited.

Mr. LOUGHTON promised to bring the bricklayers' grievance before the Committee at their next meeting.

Alderman POLLACK, in reply, said that a large number of companies dealt in fittings in exactly the same way as the Gas Committee did. The argument of the Committee was that they were charged with the success of the department; and they thought it was indispensable they should have as an auxiliary the Fittings Department. He quite agreed with the statement in its general sense, that the Corporation should not embark in trade; but that must be qualified. They were in possession of the Gas Department; and they had to take care that the department was successful. No one had such an interest to remedy complaints with reference to inefficient gas as the Gas Committee; and they were bound to have a Fittings Department if the work of the Committee was to continue to be successful. They were asked to give up the £1100 average profit, and not only that, but the rent which they paid to themselves. The amendment before them meant not only a loss of the £1000, but of the rent and other charges, which would amount in all to £2000 or £3000; and he asked whether this was the moment, when they were met by so many difficulties—water gas, the electric light, and the very heavy rise in the price of coal—that they should sacrifice the interests of the ratepayers to a very small Association.

The Council then divided, and the amendment was rejected by 29 votes to 24—one member remaining neutral.

LEEDS COUNTY COUNCIL GAS SUPPLY.

THE PRICE OF GAS.

At a Special Meeting of the Leeds County Council last Wednesday—the MAYOR (Alderman Ward) presiding,

Mr. WILSON moved the resolution of which he had given notice—"That this Council, having considered the present position of the Corporation gas-works, and the accounts issued by the Gas Committee, is of opinion that the time has arrived when the price charged to the consumers of gas should be raised, and that the price be raised to such an amount as the Council shall determine, to take effect from the 30th of June, 1889." He said that he had been of opinion for some time that they were charging the consumers too little for their gas. The gas-works should be treated as an ordinary business undertaking. They were not doing right if they supplied gas at a very low price, and made up the loss from another source. Some might say: "It does not matter; those who pay rates consume the gas." That might satisfy some people; but it did not satisfy him. They were, he contended, entitled to make a distinction between the gas consumer and the ratepayer, although all ratepayers might be gas consumers. The ratepayers were responsible for the large sum of money invested in the gas undertaking. He presumed that if electric lighting did not develop in other parts of the country with greater rapidity than it had done in Leeds, the Gas Committee had not much to fear from it; but there was another medium which had been brought prominently before the country recently. He did not predict any success or failure for that; but he did contend there was a possibility that in the future the consumption of gas might not be so large as it had been. Supposing this should take place, the ratepayers would still have to pay the interest on the sinking fund. The original cost of the works in 1870 was £763,000. The additions since then amounted to £280,000. There had been a sinking fund in operation; and £166,000 had been set aside. But whilst paying that, they had been incurring debt to the extent of £280,000; so that their three-quarters of a million had been gradually getting larger. In 1871 the working expenses of the undertaking amounted to £121,000; and the income derived from it was £135,000. They were not then, however, obliged to pay into a sinking fund. In 1887 the expenditure was £207,000, and the receipts were £205,000, so that they made an actual loss of £2000. In addition to this, they were now obliged to lay by a sinking fund, which would amount to £9000. Consequently the total annual loss was £11,000. This money must come from somewhere. It might temporarily be managed by certain financial operations; but sooner or later the ratepayer would have it to pay. They were selling their product under cost price. In private concerns this course seldom led to success; and he did not see how it could so far as the gas-works were concerned. He therefore suggested that the price of gas should be raised from 1s. 10d to 2s. 2d.

Mr. GORDON seconded the motion, and said that he had pointed out on two occasions that the Council were selling gas for less than it cost; and the defence of the Committee was that things were going to mend, and that in time the advanced value of residuals would balance the account. They said nothing then about the possibility of coal also rising in price, as it had risen. He contended that it was a false principle in a matter of this kind to rely on contingencies. The Corporation ought to deal with facts as they were; and not with hypothetical advances in certain materials, ignoring in the meantime actual increases in the price of other materials. He did not think it was any part of their business to make a profit out of their gas; but they certainly ought to sell it for as much as its production cost.

Mr. ARNOLD LUPTON pointed out that the profits made in the past, with the compound interest upon them, would more than cover any loss that was alleged to have been incurred; while, however much electricity and water gas might be introduced, they would never altogether push out coal gas.

Alderman WOODHOUSE thought the time very inopportune for a resolution of the kind submitted by Mr. Wilson. The Gas Committee, he understood, did not require £30,000 a year. They believed they could pay their way on the present price, and have something for the ratepayers.

Mr. GILSTON admitted that in ten years' time the Corporation had increased their capital in the gas-works by 3 per cent.; but he pointed out that in the same period they increased their output by 47 per cent. Since 1870 the capital account had been increased by £309,286, or 40 per cent.; while the output or the manufacture of gas had augmented by 144 per cent. He thought they would agree with him that their money had not been useless or lying idle during that time. At present they had £160,000, which had come out of the profits of the gas undertaking, invested in the name and on behalf of the ratepayers of Leeds, to cover any loss that might be sustained through the improper use or bad working of the under-

concern. He was aware that the coal-owners were increasing the price of coal 1s. 6d. a ton in order to cover the 1½d. a ton extra granted to the miners (laughter); and as the Corporation coal account might in consequence be increased by £10,000 or £15,000—he had not the figures before him, and he was speaking for himself alone—he might suggest that the question of increasing the price of gas should be referred to the Gas Committee. He was willing to propose as an amendment to Mr. Wilson's resolution that the Gas Committee should be empowered, if they saw the necessity, to increase the present price by not more than 2d. per 1000 cubic feet from the 30th inst. The additional 2d. would bring in from £15,000 to £16,000.

Mr. HUNT seconded the amendment.

Other members having discussed the matter, Mr. Gilston withdrew his proposition; and the original motion was put to the vote and negatived.

MANCHESTER CORPORATION GAS SUPPLY.

ABSTRACT OF THE ACCOUNTS OF THE GAS UNDERTAKING FOR THE YEAR ENDING MARCH 31, 1889.

In the JOURNAL last week (p. 1051), we published the report of the Gas Committee of the Manchester Corporation for the year ending March 31, 1889. We now give some particulars taken from the accounts for this period, as certified by the Auditors (Messrs. Lees and Graham):—

PROFIT AND LOSS ACCOUNT.

EXPENDITURE.

Coal and cannel		£184,772 12 11
Retort-men's wages		31,675 8 4
Retorts, materials, and setting		10,260 11 8
Labourers' wages and repairs of works, street mains, and repair of hired meters and stoves		42,648 17 3
Purifying charges		1,993 8 10
Salaries and wages		14,363 16 0
Collectors' salaries		7,424 15 7
Chief and other rents, rates, and taxes		17,801 4 0
Amount of depreciation written off for the year		33,264 0 11
Stationery, advertising, and stamps		1,206 15 4
Law expenses		43 19 2
Miscellaneous expenses		654 6 4
Official clothing		368 14 9
Painting offices, repair of furniture, and alterations		162 18 9
Subscriptions and donations		72 10 0
Bad debts written off		680 12 0
Bankers' commission and charges		247 9 3
	£347,642 1 1	
Balance, being the gross profit on the year's working	105,480 2 10	
	£453,122 3 11	
Interest on loans, consolidated stock, deposits, &c.	£28,403 9 3	
Cost of street lighting £29,387 9 2		
Less value of gas (not charged) 21,513 3 11		
	7,874 5 3	
Transferred to sinking fund	26,454 0 0	
Amount paid to the City Fund account during the year £25,000 0 0		
Balance, transferred towards the liquidation of adverse balances on the profit and loss account in past years 17,748 8 4		
	42,748 8 4	
	£105,480 2 10	

INCOME.

Gas-rental within the city—		
Private consumers £270,588 19 11		
Meter-rents 7,484 19 5		
Stove-hire 474 13 8		
Gas consumed in public lamps, not included £21,513 3s. 11d. —		
	£278,543 13 0	
Gas-rental beyond the city—		
Private consumers £95,333 3 4		
Meter-rents 3,257 17 3		
Stove-hire 208 10 1		
Public lamps 6,965 17 10		
	105,765 8 6	
	£384,314 1 6	
Coke	27,477 12 4	
Tar	24,083 16 1	
Ammonia water	16,293 8 6	
Rents	268 15 11	
Balance of bankers' interest	656 0 2	
Miscellaneous	28 9 5	
	£453,122 3 11	

GENERAL SUMMARY OF THE CAPITAL AND REVENUE ACCOUNTS.

RECEIPTS.

Balance brought forward (see summary, March 31, 1888)	£148,295 7 6
Loans received during the year	580 0 0
Amount received for brickmaking on land at Bradford Road	45 0 0
Sinking fund transferred from profit and loss account	26,454 0 0
Amount of depreciation written off capital account	33,264 0 11
Balance of profit and loss account (as per statement)	42,748 8 4
	£251,386 16 9

EXPENDITURE.

Loans repaid		£27,525 13 4
Amount paid over to the City Fund account out of profits for the year ended March 31, 1889		25,000 0 0
Expenditure on capital account		38,086 12 9
Stocks on hand	£72,172 12 2	
Gas-rents, &c., due	136,653 6 4	
Balance at Bankers	20,926 11 9	
Cash in Treasurer's hands	618 11 8	
	£230,369 1 11	
Less accounts, &c., owing by the Committee to sundry creditors	69,594 11 3	
	160,774 10 8	
	£251,386 16 9	

STATEMENT OF ASSETS AND LIABILITIES.

PERMANENT ASSETS.

Gaythorn station—land, buildings, and apparatus, less depreciation		£197,817 0 8
Rochdale Road station—do.		251,199 1 0
Droylsden station—do.		8,880 8 11
Bradford Road station—do., and amount received for brickmaking		408,246 5 8
Street-mains stores (Poland Street)—land, buildings, and apparatus, less depreciation		2,979 18 8
Street-mains—less depreciation		347,137 14 3
Service-pipes laid		52,514 6 11
Hired meters—less depreciation and amount received for damaged meters		74,107 1 4
Lamp department—do.		7,916 6 2
Hired stoves—do., and amount received for stoves sold		4,397 16 4
Cottage property purchase-money		1,652 13 6

FLOATING ASSETS.

Cannel, coal, retorts, and other material in stock		72,170 12 2
Gas-rents and sundry accounts due to the Committee—revenue account		136,653 6 4
Balance at bankers		20,926 11 9
Cash in Treasurer's hands		618 11 8
Total property and assets		£1,587,167 15 4
Profit and loss account—		
Deficiency on revenue account, March 31, 1888 £27,931 14 3		
Less profit this year 17,748 8 4		
	10,183 5 11	
	£1,597,351 1 3	

LIABILITIES.

Mortgage debt		£732,911 0 0
Sums advanced (not secured by mortgage)		1,930 0 0
Sundry accounts owing by the Committee		28,464 12 9
Deposits in hand		30,888 12 8
Interest due on same		3,591 5 10
Cash deposits for due performance of contracts		5,050 0 0
Amount payable on account of cottage property		1,600 0 0
Total liabilities		£804,435 11 3
Sinking fund, as per last report	£766,461 10 0	
Transferred from profit and loss account for the year ended March 31, 1889	26,454 0 0	
	792,915 10 0	
	£1,597,351 1 3	

(Signed) CHARLES NICKSON,
Superintendent.

APPENDIX A.

Statement of the Lamp and Private Rental (including Meter and Stove Rents) for the Year ended March 31, 1889.

Within the city—		
Private rental	£278,548 13 0	
Public lamps	21,513 3 11	
		£300,061 16 11
Beyond the city—		
Private rental	£98,799 10 8	
Public lamps	6,965 17 10	
	105,765 8 6	
	£405,827 5 5	
Deduct gas supplied to city lamps and not charged	21,513 3 11	
Total gross rental		£384,314 1 6

APPENDIX B.

Comparative Statement of the Gas transmitted from the Works in the Daytime and during the Twenty-four Hours.

	Daytime.		Twenty-four Hours.	
	Year ended March 31, 1889.	Increase or Decrease per Cent.	Year ended March 31, 1889.	Increase or Decrease per Cent.
	Cubic Feet.		Cubic Feet.	
April	57,450,000	inc. 16·88	207,096,000	inc. 2·37
May	42,735,000	dec. 6·08	156,929,000	dec. 5·56
June	42,615,000	inc. 27·97	131,377,000	inc. 11·74
July	41,899,000	„ 28·94	137,581,000	„ 17·67
August	42,514,000	„ 25·1	161,157,000	„ 13·26
September	45,380,000	dec. 6·15	202,372,000	„ 2·72
October	66,209,000	inc. 12·23	311,248,000	„ 10·17
November	70,321,000	dec. 4·55	366,795,000	„ 0·3
December	86,113,000	„ 7·3	410,326,000	dec. 5·01
January	98,178,000	„ 1·8	419,748,000	inc. 0·72
February	67,851,000	„ 3·85	317,728,000	dec. 3·29
March	68,811,000	inc. 5·56	285,912,000	inc. 2·9
Total	730,076,000	inc. 3·69	3,108,269,000	inc. 2·05

	Daytime. Cubic Feet.	Twenty-four Hours. Cubic Feet.
Year ended March 31, 1888	704,082,000	3,045,727,000
Do. do. 1889	730,076,000	3,108,269,000
Increase	25,994,000	62,542,000

	Cubic Feet.
Total quantity of gas transmitted from works	3,108,269,000
Do. measured and accounted for	2,932,959,000
Loss (by condensation and leakage)	175,310,000, or 5·64 per cent.

APPENDIX C.

In this appendix, which appeared for the first time in the accounts last year, are given particulars as to the working from June 24, 1880, to March 31, 1889. The table (which was given in full in the JOURNAL for Aug. 7, 1888) contains statistics as to the number of tons of coal carbonized, the total make of gas, the yield per ton of coal, illuminating power, residuals, &c., for each year in the above-mentioned period. It will be sufficient here to give those for the last financial year, which are as follows:—Coal and cannel carbonized, 303,617 tons; gas made, 3,107,938,000 cubic feet; yield per ton of coal carbonized, 10,236 cubic feet; illuminating power, 20·14 candles; make reduced to 20-candle power, 3,129,693,000 cubic feet; make per ton, 20-candle power, 10,308 cubic feet; make of coke, 191,412 tons; do. per ton of coal, 12·61 cwt.; make of tar, 20,052 tons;

do. per ton of coal, 12·9 gallons; make of ammoniacal liquor, 6,983,359 gallons; do. per ton of coal, 23 gallons; make at 10-oz. strength, 7,177,745 gallons; do. per ton of coal, 23·6 gallons.

Appendix D.

This appendix consists of a table showing the number of each size of meter, and also the number of stoves, in use on March 31, 1888 and 1889, respectively. Of the first-named appliances there were fixed at the former date 78,084; at the latter, 78,114—an increase of 30. Of stoves, there were 1760 in use at the end of last March, as compared with 1750 at the corresponding date in 1888; being an increase of 10. Accompanying the table is a statement showing the number of meters on hire at the two dates above named. On March 31, 1888, it was 64,707; on March 31, 1889, it was 65,595—an increase of 888. Of course, these figures are included in the totals already given.

Appendix E.

Gas-Mains Laid and Taken Up during the Year.

Laid within the city	30,096 yards	
„ beyond the city	12,490 „	42,586 yards
Taken up within the city	26,026 yards	
„ beyond the city	6,188 „	32,214 „
Net increase (or 5½ miles 192 yards)		10,312 yards
Pipes laid prior to March 31, 1888—		
Within the city	714,881 yards	
Beyond the city	453,177 „	1,168,008 „
Total length of mains laid (or 669½ miles)		1,178,320 yards

Appendix F.

This consists of a statement showing the amount of gross profit made from the gas undertaking, and the mode of its appropriation, from 1862 to March last. It is, however, sufficient here to give the figures for the past financial year, and the totals for the 27 years during which the gas supply has been in the hands of the Corporation:—

	Year ended March 31, 1889.	Total from 1862 to March 31, 1889.
Profit	£105,480 2 10 ..	£3,275,890 6 6
Appropriation of profit—		
Interest	£28,403 9 3 ..	£563,314 19 8
Liquidation of mortgage debt	26,454 0 0 ..	686,495 10 10
Surplus	42,748 8 4 ..	951,459 13 5
Street lighting (gas not included)	7,874 5 5 ..	74,720 2 7
Transferred from reserve fund	— ..	£29,943 17 9
Carried to reserve fund for contingencies	— ..	29,943 17 9
Paid over to Improvement Committee	£25,000 0 0 ..	961,642 19 4
Borrowed money owing	734,841 0 0 ..	—
Amount charged to revenue for depreciation	33,234 0 11 ..	655,905 7 5
Excess of assets	782,732 4 1 ..	—

The Policy of the Gas Committee.

At the Monthly Meeting of the Manchester City Council last Wednesday—the Mayor (Alderman Batty) presiding—on the record of the proceedings of the Gas Committee coming up for confirmation,

Alderman W. Smith called attention to the policy of the Gas Committee in setting aside large sums of money for depreciation and sinking fund. He contended that the ratepayers and gas consumers of the city had a right, as a matter of equity, to some consideration in this matter. In the Committee the motion to change the old policy was only negatived by seven votes to three; and he wished to know if in a matter of so much importance as this, seven members out of 76 were to control the policy of the Council. In Committee, Mr. Murray moved—"That the practice pursued for many years of making a charge to the profit and loss account as for depreciation of apparatus, street mains, service-pipes, and lamps be discontinued as from March 31, 1889, and that, instead thereof the profit and loss account for the current year ending March 31, 1890, be charged only with the actual expenditure during the said year for renewals, repairs, and maintenance of such apparatus, street mains, service-pipes, and lamps." This was the resolution that was negatived by seven members. He was surprised that, after a discussion, the Committee determined to retain the old policy of paying away an enormous sum each year in the shape of depreciation and sinking fund. The report stated that since 1862 the amount of money set aside for sinking fund or liquidation of mortgage debt purposes was £686,495; and for depreciation of works and mains, £655,905—making a total of £1,342,400. Now as the total liabilities were only supposed to be £804,435, he submitted that, as a matter of equity, the present ratepayers and gas consumers should participate to a larger extent than they did in the profits of the undertaking. He had referred to this matter before, and had pointed out that the policy of simply hoarding up a large property for those who come after the present ratepayers was not wise; and the question now pressing for decision was whether or not the Council would continue to uphold the policy of the Committee. He moved, as an amendment, that the minutes of the Gas Committee be approved, with the exception of the portion relating to this question.

Mr. Southern seconded the amendment, and urged that a reduction in the price of gas would lead to a much greater use for heating purposes in lieu of coal, and thereby to greater purity of the atmosphere and improvement of the public health.

Alderman Sir J. J. Harwood pointed out that, in view of the possibilities of electric lighting, and the use of other illuminants, the Committee were acting wisely in the course they had adopted; and he asked the Council to have confidence in the Committee. The question of supplying electricity had been before the Government in the present session; and the Council could not much longer delay either the supply of electricity themselves, or permitting someone else to supply it under suitable regulations. What the Committee said was this—that under the present circumstances, and looking not only at the possibility but the probability of gas being to a very large extent superseded by the electric light, the course proposed was desirable. The ratepayers of Manchester had the entire responsibility of the gas-works; and if they were to be blown up, or if any accident happened to them, they would have to make it good. If they were to be superseded, the whole amount, to the extent of that supersession, would be lost to the ratepayers and not to the out-townships. Gas at 3s. per 1000 cubic feet, with an average illuminating power of 19 candles, was about as cheap as anything which could be obtained. The price proposed was 2s. 6d. inside the city, and an extra 6d. outside. He was reminded by Alderman Hopkinson that the extra charge of 6d. per 1000 feet only paid for the additional cost in the delivery of the gas. Looking at the management of the Gas Committee during the last ten years, he asked whether it had been such as to merit the confidence of the Council? If it had been, then—having discussed the question with all the experience before them, with all the present facts, and with an accumulated amount of information with regard to the electric light and other matters—if the Committee had come to the conclusion to adopt their present course, it was not too much to ask that the confidence of the Council should be placed in them, at all events for the present.

Alderman Bennett expressed the hope that the Council would support the Committee in their present policy. Of all the assets of the Corporation, he looked upon the gas-works as the least permanent. The Gas Committee's assets were something very large to-day, but such was the advance in electricity and in chemical science generally that, in his opinion, the assets of the Committee might not be worth a quarter next year what they were worth to-day. He did hope, therefore, that they would look to themselves as well as to their posterity. The system at present pursued by the Gas Committee was well worthy the assent of the Council. Alluding to water gas, he said it appeared that it could be easily produced for about 6d. per 1000 cubic feet; and he had no doubt that in a very short time it would supersede several other illuminants. The British Water Gas Syndicate had, he believed, offered to light one of the great railway stations in London at 20 per cent. less than was now being paid for gas or any other light. In his opinion this was a very serious affair for the Gas Committee; and he considered, although they might be anxious to have a reduction in their sinking fund, and not set aside so much for depreciation, that the Committee were acting most wisely in the course they were pursuing, and he hoped the Council would support them.

Mr. Bagnall remarked that it was also necessary for the Council to take into consideration the competition they were likely to receive from the use of oil.

Mr. Lloyd thought the Committee could scarcely depreciate their property too much, in view of what was threatened. Oil had obtained a very firm footing as an illuminant in America.

Mr. Murray, speaking in support of the amendment, said his feeling was that a very great injustice had been done to the ratepayers in making this annual and regular reduction for depreciation. The reason given for it in the annual report of the Gas Committee, he thought, was rather childish. They were told that, in view of the unsettled state of the various illuminating agents, and the possibility of gas being to some extent superseded, the Committee had thought it desirable for the present to continue both the depreciation and the sinking funds. This was all very well for to-day; but was that any reason why during the last thirty years a large amount—fully £20,000 per annum—should have been deducted from the profits of which the ratepayers should have had the benefit? He was told that it was a matter which had been before the Gas Committee for years. He thought it was not very creditable to say so, and to find now that so little had been done. It was now time to consider whether some change could not be made. They had an Act of Parliament under which the borrowing of money was sanctioned. The Town Clerk had reported over and over again that the requirements of the Act of Parliament had been fulfilled in the provision of the sinking fund, and that there was nothing more to do. He had read the Act, and was perfectly clear that the whole surplus profits should be used for the benefit of the ratepayers. The charge made was unauthorized, and was unprecedented in any corporation so far as he was aware. They had no right to go on accumulating a fund equal to £200,000 or £300,000, which, though it did not appear on the face of the accounts, was nevertheless a charge upon the profits. There was no corporation in England where accounts were kept in such a confused and irregular way as were the accounts of the Manchester Gas Committee; and it was time to make some change.

Mr. Worthington supported the amendment; observing that he had hoped the price of gas might have been reduced to the extent of 4d. per 1000 cubic feet. Even if the depreciation fund was continued, there was room for a large reduction.

Alderman King said the views advanced by Alderman Bennett and Mr. Murray had been fully considered in Committee, with the result that it was not thought desirable to make any change.

Alderman Hopkinson remarked that a careful consideration of the merits of the Committee's policy many years ago convinced him of its soundness; and he had seen no reason since to alter his opinion.

Mr. Mark suggested that the Committee should reconsider this question of setting aside so much each year for depreciation and sinking fund purposes, and see if they could not reduce the amount.

Mr. Richards supported the amendment, and asked the Committee to follow the example of certain other towns and give a discount to those who paid their gas bills direct within a specified time.

Alderman Lamb, Chairman of the Committee, said the question now raised by Alderman Smith was considered at three special meetings of the Committee; and the result was that they did not see any advantage in making an alteration. They therefore decided to let well alone.

On a division being taken, 23 voted for the amendment, and 29 against it; and the proceedings of the Committee were then approved.

Sale of Shares.—Some original £10 shares in the *Eastbourne Gas Company* were recently sold at £26 15s. and £25 17s. 6d. per share, and a few "B" shares fetched £20 2s. 6d.

The Howden Water Company's Works.—The shareholders of the Howden Water Company, at their recent annual meeting, agreed to a recommendation of the Directors to raise, by the issue of the balance of the authorized debenture stock, a sum of £1300 to be expended in the erection of a water tower and storeage tank.

The Application of the Coal Dues in the City.—At the meeting of the Court of Common Council last Thursday, Mr. Cloudesley asked whether it was the fact that all the moneys which had been, or were, received now from the coal dues had been expended in public improvements or in discharge of liabilities incurred for public improvements. The City Chamberlain (Mr. B. Scott) said that for more than a quarter of a century the coal duties of the Corporation had been applied to the Holborn Valley and Viaduct, and for no other purposes whatever.

New Electrical Companies.—A Company has been formed bearing the title of the Electric Construction Corporation, Limited, with a capital of £500,000 in £10 shares, for the purpose of acquiring the following Companies and patents:—Elwell-Parker, Limited; the Electrical Power Storeage Company, Limited; the Railway Electrical Contractors, Limited; the Julien Patents for Electric Traction; and the Sprague Patents for Electric Traction and Transmission of Power. The prospectus of the Corporation states that it has been established to "supply the enormous demand for all kinds of electric machinery which has arisen in consequence of the remarkable development of electricity both as an illuminating and a motive power, a demand which is daily increasing and far exceeds the manufacturing power of existing works."——The Woking Electric Supply Company, Limited, has been registered, with a capital of £20,000 in £5 shares. A local contemporary informs its readers that a "fair demand" has been made for allotments of shares in this Company.

BLACKBURN CORPORATION GAS SUPPLY.

The Accounts for the Year Ending March 25, 1889.

In the Journal last week (p. 1056) we noticed briefly the accounts of the Blackburn Corporation Gas Department for the year ending March 25 last, as recently presented to the Gas Committee by the Engineer and Manager (Mr. S. R. Ogden). We are now able to deal with them more fully. The revenue account shows that nearly 389 million cubic feet of gas were consumed for ordinary lighting, 17 millions for gas stoves and engines, and 47 millions for the public lamps; the revenue produced being £58,057, £2007, and £6074, against £56,956, £1672, and £5929 for the preceding year. After deducting discounts, the total is £63,302, against £61,771. The residuals produced £10,350—about £300 less than before; and other receipts bring up the total to £76,600, against £75,249 in 1887-8. The manufacture of gas cost £38,862, against £37,760; distribution, £3215, against £3494; management, £1396, against £1387—the total expenditure being £49,300, against £48,827. The balance carried to the profit and loss account is £27,299, as compared with £26,422 in 1887-8—a difference of £877. The total to the credit of this account on March 25 last was £27,401, which is thus disposed of: Transferred to loans fund account for the extinction of stock, £3150; do., for interest on annuities redeemed, £30; transferred to sinking fund account, £412; interest on 4 per cent. stock and deposits on loans, £1840; transferred to loans fund account for payment of year's interest on 3½ per cent. stock, £20,036; carried to reserve fund account, £1925. This last payment brought up the account to £8829, of which £5007 was expended in the renewal of plant, stoking machinery, and other apparatus at No. 2 station; leaving a balance of £3822 to be carried forward. The following is Mr. Ogden's working statement for the past financial year:—

Gas made, as per station meter		493,011,000 cubic feet.
Gas sold to private consumers	406,592,100	,,
Do. for public lighting	46,949,400	,,
Gas used on works	2,780,200	,,
	455,321,700	,,
Gas unaccounted for	36,689,300	,,
or 7·4 per cent.		
Coal carbonized (common, 31,586 tons; cannel, 14,196 tons)		45,782 tons.
Illuminating power of gas required by Act		16 candles.
Do. supplied		20 ,,
Gas made		493,011,000 cubic feet.
Do. per ton of coal		10,768 ,,
Gas sold		453,541,500 ,,
Do. per ton of coal		9,906 ,,
Do. per cent. on make		92 per cent.
Do. used at works		2,780,200 cubic feet.
Do. per cent. on make		·56 per cent.
Gas unaccounted for		36,689,300 cubic feet.
Do. per cent. on make		7·4 per cent.
Coke made		28,500 tons.
Coke used for fuel		9,440 ,,
Do. per cent. on make		32 per cent.
Average price of coke sold		4s. 3d. per ton.
Tar made, 3072½ tons = at 200 gallons per ton		614,400 gallons.
,, per ton of coal carbonized		18½ ,,
Average price of tar per gallon		·89d. per gallon.
Liquor made, 5983 tons = at 220 gallons per ton		1,316,260 gallons.
Liquor made per ton of coal carbonized		28 ,,
Average price of liquor		·65d. per gallon.
Net proceeds of coke and other residuals on cost of coal		39 per cent.

	£ s. d.	£ s. d.	Per Ton of Coal Carbonized. s. d.	s. d.	Per 1000 Cub. Ft. of Gas Sold. d.	d.
Coal carbonized	—	26,536 18 0		11 7·11		14·04
Less residuals—						
Coke	4,436 9 9		1 11·26		2·35	
Tar	2,308 13 0		1 0·08		1·22	
Ammoniacal liquor	3,609 19 8		1 ·692		1·91	
		10,355 2 0		4 6·26		5·85
Net for coal	—	16,186 16 0		7 0·85		8·56
Manufacture—						
Purifying	722 6 9		0 3·79		0·38	
Salary of Engineer	700 0 0		0 3·67		0·37	
Wages at works	7,108 16 9		3 1·24		3·76	
Repairs and maintenance of works	3,799 3 6		1 7·92		2·01	
Salaries of meter inspectors	668 5 0		0 3·50		0·35	
Repairs of mains and services	830 18 7		0 4·36		0·44	
Repairing, renewing, and refixing meters	1,626 9 5		0 8·52		0·86	
Rents	418 7 7		0 2·19		0·22	
Rates and taxes	4,187 7 5		1 9·96		2·22	
Salary of Chief Clerk and office clerks	658 18 0		0 3·45		0·35	
Collectors' salaries	384 0 8		0 2·01		0·20	
Stationery and printing	142 11 6		0 0·75		0 08	
General establishment charges	205 18 10		0 1·08		0·11	
Auditors' salaries	40 0 0		0 0·21		0·02	
Bad debts and deductions	92 4 11		0 0·48		0·05	
Total working expenses	—	21,580 8 11		9 5·13		11·42
Coal and working expenses, less residuals	—	37,767 4 11		16 5·98		19·98
Rental	57,582 5 9		25 1·60		30·44	
Public lighting	5,770 6 6		2 6·24		3·05	
Total, rental and lamps	—	63,302 12 3		27 7·84		33·49
Profit on gas manufacture	—	25,535 7 4		11 1·86		13·51

Summary.

Profit on gas manufacture, as above		£25,535 7 4
Less amount for gas cookers	£835 12 10	
Do. bank interest	317 15 5	
		1,183 8 3
		£24,351 19 1
Add not included in the above—		
Rental of meters and gas-cookers	£26,58 0 10	
Sundries—receipts	232 15 9	
Profit on meters sold	6 10 4	
,, fittings	49 15 2	
Transfer fees	0 12 6	
	2,947 14 7	
Profit		£27,299 13 8

The Liquidator of the General Gas Heating and Lighting apparatus Company, Limited, has declared a first and final dividend of 1s. in the pound to be paid, on and after Friday next, on all claims admitted under the liquidation.

DUNDEE GAS COMMISSION ACCOUNTS.

The accounts of the Dundee Gas Commission for the year ending the 30th of April, have been issued in pamphlet form. They show that the estimated revenue was £71,079 1s. 2d.; while the actual amount realized was £73,154 17s. 5d.—an increase of £2075 16s. 3d. The gas sold realized £64,091 14s. 10d.; meter rents, £2643 10s. 10d.; and chemical products, £5277 7s. 8d. The estimated expenditure was £70,966 12s. 8d.; and the actual outlay, £73,241 4s. 4d.—an increase of £2254 11s. 8d. On the year's working there is a debit balance of £86 6s. 11d.; but the debit of £1356 16s. with which the year began, has been met. Bad debts amounted to £145 19s. 6d.; or only 4s. 4d. per cent. Outstanding accounts at the end of the year were £3894 9s. 7d.; or £70 less than the previous year. The total quantity of gas manufactured was 406,341,800 cubic feet, of which 365,854,500 cubic feet were sold; leaving 34,739,600 cubic feet unaccounted for, which is at the rate of 8·549, or 1 per cent. more leakage than in the previous year. The quantity of coal carbonized was 37,326 tons; and the cost, £35,423 2s. 3d. For the current year the estimate, calculating on an output of 420,000,000 cubic feet, is an income of £72,674 15s. 6d. and an expenditure of £72,454 10s. 8d.; leaving a surplus of £220 4s. 10d. The price of gas is to be reduced from 3s. 8d. to 3s. 6d. per 1000 cubic feet.

HALIFAX CORPORATION GAS SUPPLY.

The Gas Scandal—The Coal Contracts.

At the Monthly Meeting of the Halifax Town Council last Wednesday, the Mayor (Alderman J. Booth), alluding to a resolution passed by the Council at their last meeting (*ante*, p. 867), requesting the Sub-Committee appointed to inquire into the gas scandals to present a report to the Council giving the result of their investigations, explained that it had unfortunately happened that both himself and the Town Clerk had been a good deal away during the month, and when they had been at home Alderman Ramsden had been absent; consequently they had been unable to prepare a report. He hoped, however, that by the next Council meeting their report would be ready. The minutes of the Gas-Works Committee contained particulars of certain contracts just entered into for the supply of coal for the twelve months ending June 30, 1890; and one of these contracts was with Messrs. Milnes, Stansfield, and Co. for the supply of 7000 tons of "new hards screened coal." Alderman Riley moved that that item of the minutes be referred back to the Committee, urging that he was anxious that the Council should not make a mistake, as in entering into that contract they were confirming the action of the late Gas Committee in taking all their new hards coal from Messrs. Milnes, Stansfield, and Co. He quoted the remarks of Mr. J. Paterson and Mr. S. Hayward in the report which they had presented to the Council as the result of their previous investigations into the coal contracts, and pointed out the inconsistency now displayed by the Gas Committee in accepting the statements contained in the report alluded to, and then making their contracts on the lines adopted by the late Gas Committee. He said he had not asked anybody to second this amendment—indeed he did not think anybody would be so foolish; for after all he thought it was the best thing the Council could possibly do. The amendment was not seconded; and the minutes of the Committee were passed without further comment.

BURTON CORPORATION GAS SUPPLY.

Reduction in the Price of Gas and Meter Rents.

At the Monthly Meeting of the Burton-on-Trent Town Council last Wednesday—the Mayor (Mr. C. Harrison) presiding—there was a short discussion on a proposal, of which notice had been given, to lower the price of gas and to lessen by a substantial amount the charges for meter-rents.

Alderman Lowe moved that the price of gas to all consumers within the Corporation lighting district be reduced 3d. per 1000 cubic feet, as from the 25th of March last, and that the rents and charges for the use of meters be reduced as from the same date. He said the reduction recommended in the meter-rents practically amounted to one-half of the charge usually made. The Committee in considering this question, had been anxious to ascertain not only what reduction could be made, but also to find out, if possible, whether there were any other changes that could be effected to the advantage of the general body of consumers, and especially the less wealthy and smaller consumers. Complaints had been made from time to time that the meter-rents and the charge for fixing the meters (5s.) pressed very heavily upon the small consumers. A few years ago the Committee recommended, and obtained a reduction in the price of the rents; but when the question was before them recently, they went into the matter thoroughly, and he believed every member of the Committee wished that, if it were possible, meter-rents should be abolished. Just as they were about to make a recommendation to that effect, the Town Clerk, who was usually very cautious, said he was not quite sure that the law would allow them to carry out their intentions; and as an investigation of the question did not re-assure him, the Committee requested him to take Counsel's opinion upon it. This had been done; and Mr. Montague Cookson, Q.C., had laid it clearly down that the Council could not abolish meter-rents nor the charges for fixing the meters, and they decided that the next best thing for them to do was to reduce the charge by one-half. At a meeting of the Committee in April, a balance-sheet relating to the working of the concern during the past year was presented. It showed that the profits were £8832, or £425 less than they were the previous year; and, under all the circumstances, the Committee felt that, in recommending a reduction of 3d. in the price of gas and about one-half in the charge for meter-rents, they were taking a bold step. The profits last year, as he had said, were £8832. Two months ago they voted from the profits in aid of the rates £6000; the reduction of the meter-rents and charges meant £360; taking 3d. per 1000 cubic feet off the price of gas represented the sum of £2291; and the additional cost of coal was something like £1706. These figures amounted to £10,364, which would be taken away from the gas profits. Of course, from this sum they would have to deduct £600—the price obtained for coke—and this would leave a deficiency of £932. The Committee, however, hoped that their recommendation would prove an incentive to the general public to use the gas, and that the loss of £932 would be met by a greatly increased number of consumers. The Committee, he added, would also get an increased price for chemicals.

Mr. Rugg, in seconding the motion, congratulated the Committee upon the prompt action they had taken in reducing the price of gas. He only regretted that they had not seen their way to do so without being prompted by the resolution he brought forward, and which was unfortunately resisted. The public, however, would be pleased to accept this small mercy, although personally he should not be satisfied until he had seen the price very much more reduced; and he hoped the day was not far distant when the consumers would have as their right the gas at the cost of production.

Alderman Wardle felicitated the Committee upon their tardy conversion to what he had recommended for some years. Alderman Lowe, he said, had told them that the Committee were anxious to abolish meter-rents;

and in their anxiety they took Counsel's opinion. If they could not altogether abolish them, why did they not reduce them to a nominal sum—say 3d. a year—instead of half the amount hitherto charged, especially as they pressed heavily upon the small consumers.

Mr. Turner was glad that the Committee had seen their way to reduce the price, and would have been glad if they had taken off a little more. The charge for making meter connections he thought very excessive, and believed it was capable of being considerably reduced, without the efficiency of the work being interfered with.

Alderman Lowe, in reply, said the Committee did not resist the resolution brought forward by Mr. Rugg. He (Alderman Lowe) believed the recommendation of the Committee would prove a greater boon to the gas consumers than the motion, had it been carried, of Mr. Rugg, who did not touch the question of meter-rents. There were 43 towns in the whole of England where the price of gas supplied by the corporations was lower than in Burton, and there were as many as 72 where it was higher. As to Mr. Wardle's gratification at the conversion of the Committee to his recommendation, no resolution for reducing the price of gas had been brought before them, or it would have been taken up. Mr. Montague Cookson said distinctly that the Council could not make merely a nominal charge for meter-rents; but they must charge a reasonable amount. In conclusion, he referred to the proposed installation of the electric light, and said inquiries showed that the cost would be astonishingly large, and that any money they might have in hand would be required for it.

The motion was agreed to.

NEATH CORPORATION GAS SUPPLY.

The Manager's Annual Report.

The report of the Gas Manager of the Neath Corporation Gas-Works (Mr. R. A. Browning) for the year ending March last, was presented at the meeting of the Council yesterday week; and the results exhibited therein are very satisfactory. Referring first to the capital account, the report says that the statement of loan capital shows that, out of the £50,400 borrowed from the London Assurance Corporation, £21,746 has been repaid, leaving a balance of £28,653 now due. From the amount (£1700) authorized to be raised for the purposes of increased expenditure of capital, £1200 has been borrowed locally to meet the requirements of increased storeage, &c.; so that the amount of expenditure carried to statement "B" of capital account is £1233; but of this there has been an exceptional outlay of £1056 in the telescoping of the large gasholder. Concerning the revenue account, the gross profit, after meeting all working expenses, bad debts, and allowances, amounted to £2007 19s. 9d. This, in Mr. Browning's opinion, is very satisfactory, considering the many difficulties they have had to contend with during the time the large gasholder was out of action owing to the work of telescoping it, which meant that the town was placed for some months under short supply (having only one small holder to depend on), an increased cost of manufacture, loss by leakage, &c., and a larger amount of cannel coal used than formerly. Although a loss of about £400 was experienced, due to the reduction of gas from 3s. 9d. to 3s. 4d. per 1000 feet, and public lamps from £4 4s. to £4 per lamp, still there was a steady increase in the consumption, and a satisfactory increase in the consumers of about 10 per cent. As to the residual products, these show a favourable increase of about £140 compared with the previous year; the marked increase in the manufacture of sulphate of ammonia, which is about £80, being due to the more economical and improved apparatus employed in its manufacture. With respect to manufacture, the report mentions that the amount of purified gas produced per ton of coal carbonized was 10,005 cubic feet, the illuminating power of which averaged rather more than 15 candles. Regarding profit and loss account, it is stated that, subject to approval, the net profit has been appropriated as follows:—After paying £1356 for interest on mortgages and bank, £50 has been carried to the depreciation account, which now stands at £850; and repayment account receives £500—carrying forward a balance of £247 to the next account. The report was adopted; and, in the course of the after proceedings, a tender was accepted for gas coal at 12s. 9d. per ton, and also an offer of 7s. 6d. for the surplus coke.

STOCKPORT CORPORATION GAS SUPPLY.

The Position of the Undertaking.

At the Monthly Meeting of the Stockport Town Council last Wednesday, the Mayor (Mr. J. Leigh, J.P.), who presided, gave some interesting particulars regarding the working of the Gas Department.

The Mayor moved the adoption of the minutes of the Gas Committee; and in doing so, said their annual report had just been issued, and from it it appeared that the consumption of coal during the year was nearly 35,000 tons, and the turnover about £59,000 sterling. The increased consumption of gas during the year was about 3¾ per cent. The reduction in the price of gas last year was 1d. per 1000 cubic feet to private consumers, and 3d. per 1000 feet to the public lamps—representing a decrease of income to the extent of £1450. Notwithstanding this deduction, they were able to make a profit of £6600. This year they had had to pay more for the new contracts for the cannel and coal; but they would get additional value for the tar and ammoniacal liquor. He was enabled to inform the Council that there was not the least likelihood that there would be any increase in the price of gas for some years to come. He mentioned this because one of the members made a statement that the increase in the price of gas was one of the things looming in the distance. The Committee had material to last nearly three years; and taking into consideration the contracts, he thought he might fairly say that for many years to come the price would not be raised. It would be interesting to know that the Committee hired out about 180 cooking-stoves; but altogether there were in use in the town about 500—many people having bought them. As an illustration of the amount of work done by the staff at the works, he said that there had been laid down during the year 3¼ miles of mains; making a total of about 110 miles in the district. They had been looking to see what proportion the capital invested in the plant of the gas-works per 1000 cubic feet of gas delivered, bore to the same in various other corporations and companies, and found that there were very few plants valued at so low a figure as that at the Stockport Gas-Works. This only bore out the remarks frequently made, that the works were worth considerably more, if not double, what they stood at in the assets. Out of the 27 towns they took promiscuously, there was only one where the plant stood lower in proportion to the work it performed than in their case. The consumption of the gas in the town was increasing at the rate of 4 to 5 per cent. per annum; and the plant last year was taxed almost to its utmost capacity to produce the supply demanded. The largest delivery in 24 hours was 2,449,200 cubic feet, or a little more than 100,000 cubic feet per hour. He thought the Council were very much indebted to the Gas Engineer (Mr. J. Jacques) and his staff for the careful way in which they conducted the very important works under their management.

Alderman Walmsley said the leakage when he first became connected with the Gas Committee amounted to 27 per cent.; and now it was only 8 or 9 per cent. This showed what care had been exercised at the works. He spoke of the great increase in the number of stoves used in the town, and thought that the advantage derived from their employment warranted a more general use of them.

Mr. Morley said he thought, notwithstanding the remarks made by the Mayor, which were very encouraging, that there would in a few years to come be an increase in the price of gas.

The minutes were then passed.

THE PUBLIC LIGHTING OF READING.

Adoption of the Electric Light.

The question of the public lighting of the town received a somewhat extended consideration at the meeting of the Reading Town Council last Thursday. The minutes of the Highways, Streets, and Gas Committee included a report from the Sub-Committee appointed on the 5th ult., to the effect that they had given consideration to the whole subject of the lighting of the town, in view of the termination on the 30th of June next of the existing contract with the Reading Gas Company; and that they had conferred with the Gas Company and with Messrs. Laing, Wharton, and Down, electrical engineers, who are supplying electricity for lighting purposes in Reading. The Directors of the Gas Company had announced their intention to reduce the price of gas 3d. per 1000 cubic feet to all consumers; and in any future arrangement with the Company for public lighting, the Council would have the benefit of this reduction. The Directors had submitted to the Sub-Committee suggestions for securing improvements in the lighting of the town by gas; and the cost of lighting the various classes of lamps referred to in such suggestions. The Sub-Committee had also received a proposal for lighting the principal parts of the town by electricity, from Messrs. Laing, Wharton, and Down, who suggested that the wires for the purpose should be carried overhead, and that the lamp-posts and supports should be supplied by the town. The cost of the gas consumed in the lamps displaced by 30 arc-lamps properly disposed in the places intended to be lighted, they calculated at £455. With respect to the cost of the electric light, they said they were prepared to supply on the following terms, the lamps to be alight for 3900 hours per annum:—£25 per lamp per annum on a five years' contract; or £24 per lamp per annum on a seven years' contract. Taking £25 as the basis of the cost of the electric light, with 30 lamps, the cost would be £750, against £455 the present estimated cost of the gas; but "ten times the light is given." In other words, they said, the cost per candle power per annum was: Electric light, 5d.; gas, 41d. The Committee did not make any recommendations in regard to the matter; and the report was adopted. Mr. Field then brought forward a resolution to authorize the Sub-Committee of the Highways, Streets, and Gas Committee to arrange the terms of a contract with the Gas Company for the lighting of the public streets upon a specified basis, in which provision was made for the discontinuance of the gas-lamps during the whole or any part of the night within any area which the Council might determine to light by means of electricity. The resolution was approved. Mr. Dodd next proposed—"That it is advisable that arrangements should be made, as soon as practicable, for lighting by electricity throughout the whole night such a district as it may be possible to light satisfactorily with 30 electric lamps; and that the Highways, Streets, and Public Lights and Gas Committee be authorized subject to the approval of the Council, to arrange with Messrs. Laing, Wharton, and Down, the electrical engineers, accordingly." He remarked that he had formed the opinion that the electric light recently shown in the town was very desirable indeed for public lighting; and the sooner they took into consideration the lighting of the town by this means, the better. He intimated that he did not think the Gas Company feared the electric light at all. The motion having been seconded, the question was fully debated; and, in the end, the resolution was carried by 14 votes to 9.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

Edinburgh, *Saturday*.

A systematic attempt is at present being made by the Edinburgh Trades' Council to promote trade combinations in this city. Of late they have held frequent meetings, urging the formation of associations among the workmen, in which they are sometimes successful. On Thursday night they devoted their attention to the men employed at gas-works of Edinburgh and Leith, whom they convened in the Moulders Hall. Mr. Thomas Blackie, the Treasurer of the Trades Council, presided. He told his hearers that the trades which were best organized were those which enjoyed the shortest hours of labour and stood best in respect of wages. He did not know what was the present position of the gas workers of Edinburgh and Leith, but he knew that some time ago, when a difference arose between them and their managers, the men were able to get something out of the Corporation. He believed, however, that their employers sought to sacrifice some of the workers, and did actually sacrifice them. Now, if the men were combined and organized, they would be able to support any workmen who might be sacrificed in that way; while, if they had a grievance to submit, or a request to make to their employers, either now, or in the future, they would secure respect being paid to their representations if they could present a united front. One of the gas men who spoke said they had a great many grievances in the works that required to be remedied. But it was very hard to get them remedied; and it was as difficult to form a union, owing to the coming and going of the men in winter time. The wages were not such a great grievance; but Sunday work was a great matter of complaint. They wanted time-and-half for Sunday. A resolution setting forth the necessity of the gas workers forming a union was adopted. The whole affair is, in my opinion, simply an attempt to manufacture grievances at the behest of the few who arrogate to themselves the position of leaders among the working classes—a description of agitator who frequently does more harm than good.

The Aberdeen Town Council, at their meeting last Monday, agreed to Mr. Smith's recommendation to introduce machinery into the gas-works, reference to which matter was made in my "Notes" last week.

The Dunbar Gas Commissioners, at their meeting last Thursday, had some difficulty in regard to their coal contracts. They had before them estimates to supply Hillhouse coal at 12s. 10d. per ton; Newbattle at 21s.; Arniston at 20s.; Niddrie at 18s.; and Boghead at 19s. 5d. The Committee's recommendation was that they select 400 tons of good, and 200 tons of cheap coal. It was stated that last year the coal carbonized was 597 tons, and that it produced 162,000 cubic feet of gas less than it should have done. A loss of £18 had also been sustained on coke, making £80 in all less than was anticipated, which the Commissioners attributed to the quality of the coal. I am afraid the Commissioners expected too much from their coal. Provost Brand told them that a test in the laboratory never stands a working test. The analyses submitted by the officers showed a yield by Newbattle coal of 12,461 cubic feet per ton of 35·34-candle power; Niddrie, 12,330 cubic feet of 32·50-candle power; Arniston, 12,057 cubic feet of 36-candle power; Boghead, 13,215 cubic feet of 37·56-candle power; and Hillhouse, 9818 cubic feet of 25·21-candle power. Any Gas Manager who could produce these results with the plant in the Dunbar works would almost work a miracle, as the Commissioners will

by-and-by understand. After a discussion, in the course of which the Gas Manager (Mr. Cuthbertson) advised that only two descriptions of coal should be obtained—Niddrie and Arniston or Drydean—it was resolved first of all to try a small quantity of Boghead. It will be observed that Boghead is given as producing the best results of all the coal offered, and that the price is lower than some of the others, which, of course, explains their selection of it for trial. The Commissioners accepted an offer of 2s. 6d. per ton for coke, or 1s. 6d. above the price realized last year.

The members of the Aberdeen Mechanical Society opened their summer session last Saturday by a visit to the Aberdeen Corporation Gas-Works. Mr. A. Smith, the Manager, who is an honorary Vice-President of the Society, showed the members round the works, and gave full explanations of all the processes and appliances. At the close of the inspection, a vote of thanks was passed to Mr. Smith.

The Board of Management for the Montrose Lunatic Asylum have resolved to introduce electric lighting into the building. At present the annual gas account is £270; and, with an extension which is in progress, it is estimated that in future the annual charge would be £356. Gas is still to be used in the bedrooms; and taking this and other circumstances into account, it is difficult to see how the cost of the new light is to be defrayed, except at the expense of the unfortunate patients.

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday*.

The annual meetings of the gas companies throughout the West of Scotland have now made a decided beginning. On Thursday of this week the general meeting of the shareholders of the Largs Gaslight Company, Limited, was held. On the recommendation of the Directors, it was unanimously agreed that the price of gas for the ensuing financial year should be reduced from 5s. to 4s. 7d. per 1000 cubic feet; the reduction to take effect from and after the August quarter. The usual dividend of 6 per cent. was declared.

The Stevenston (Ayrshire) Gaslight Company held their annual meeting on Tuesday. A dividend of 5 per cent. was declared. It was agreed to purchase a station meter for the works, and to have the mains overhauled, with the view of checking the leakage of gas which is heavy.

The annual meeting of the Falkirk Joint-Stock Gas Company, Limited, was held on Tuesday. The Directors' report, to which I referred last week, was adopted; and a dividend at the rate of 2s. 9d. per share, payable on July 1, was declared. An extraordinary general meeting of the Company was also held, when resolutions, increasing the nominal capital of the Company to £50,000, and making various alterations in the rules and regulations, were considered and passed.

The question of water gas was introduced at the monthly meeting of the Glasgow Town Council on Thursday. It arose out of the report which Mr. Foulis had prepared on the subject at the request of the Works Sub-Committee of the Gas Trust, an extract from which appeared in last week's JOURNAL (p. 1039). When the minutes of the Gas Committee were submitted for approval by Mr. Ure, the Convener of the Sub-Committee, Mr. Martin, expressed dissatisfaction with the report, pointing out that it was a strange proceeding to send Mr. Foulis to Leeds to report on the subject, when it was known that he was opposed to the introduction of water gas. In criticizing the report, he said that the saving per 1000 cubic feet would be much more than 8d. to 11d.; and he thought that water gas could be supplied to the citizens at less cost than coal gas. They had it on the authority of a large works that, by the use of water gas, there had been a saving of upwards of £10,000. The Lord Provost remarked that the gas in the place referred to was used for heating and not for illuminating purposes. Mr. Martin said there were cities in America where water gas was in full operation for lighting. Mr. Mechan observed that the report was a perfectly proper one, and was thoroughly intelligible to everyone who understood the matter.

At the monthly meeting of the Kilmarnock Town Council this week, it was reported by the Clerk that mortgages on the gas-works to the amount of £3000 had been paid up; thereby reducing the debt on the works to that extent.

The Gas Committee of the Hamilton Corporation reported at a meeting of that body on Thursday that they had considered a report by the Manager in regard to the loss of gas by leakage in the pipes, and that they had approved of four governors being laid down throughout the burgh at an estimated cost of £32. It was explained that the governors would check the pressure in high-lying localities where the greatest amount of leakage occurred. The Provost in moving the adoption of the report said that the loss from leakage had been increasing steadily year by year, until during the past year it had arrived at upwards of 15 per cent. The report was adopted. I may state that a large portion of the town of Hamilton is extensively undermined by coal workings; so that there are frequent depressions in the pipe tracks taking place.

In regard to the business in sulphate of ammonia during the past week, it may be mentioned that shipments have been affected very considerably by the cessation of most of the sailings from Leith in consequence of the strike amongst the sailors at the port for an advance of wages. The price, however, remains firm at about £12 per ton, and the inquiries for summer and autumn shipment continue to be fairly active.

The pig-iron market has again been unsteady during the week; and Scotch warrants have fluctuated in price between 43s. 4d., 42s. 5d., and 43s. 0½d. per ton cash. An attempt was made at the beginning of the week to squeeze the "bears" in West Cumberland hematite warrants, the price of which rose rapidly on Monday. Subsequently, however, selling orders from outside holders came in, which eased the market. Scotch special brands are officially unchanged in price; but in second hands they are a trifle easier.

No very material effect has as yet been produced on the Lanarkshire coal trade by the seamen's strike, which has been in operation for some days. The demand for steam coal is opening up; and there is a steady demand for splint coal. Main coal is not in such active request as formerly; and house descriptions are a shade lower in price.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 8.

Sulphate of Ammonia.—The market seems to be in a calmer mood, and is no doubt influenced by the holiday feeling pervading trade generally at this season of the year. At all events, German buyers have not been so determined in their operations; and French and Belgium buyers cling to the theory of cheaper prices by-and-by. Meanwhile full prices continue to be paid; and business has been done at £12 2s. 6d. f.o.b. Hull and Liverpool, and at £12. Leith, although some small second-hand parcels have been offering at a trifle under these quotations. Sellers generally anticipate a renewal of the demand after the holidays; and there is little doubt that prices will be maintained. The nitrate market is without any change, and closes quite steady.

LONDON, *June* 8.

Tar Products.—The market if undoubtedly "slack"—no doubt arising, first, from the small production; and, secondly, from the proximity of the holidays. A fair quantity of anthracene has changed hands at a considerable drop on the prices of previous sales. Benzoles, and the lighter products, however, are difficult to sell. Prices: Tar, 22s. 6d. to 26s. per ton, according to position. Benzol, 90 per cent., 2s. 10d. per gallon; 50 per cent., 2s. 1d. per gallon. Toluol, 1s. 5d. per gallon. Solvent naphtha, 1s. 3d. per gallon. Crude naphtha (30 per cent.), 1s. 0d. per gallon. Light oil, 3½d. per gallon. Creosote, 2¼d. per gallon. Pitch, 22s. per ton. Carbolic acid (crude), 8s. 10d. per gallon. Cresylic acid, 10d. per gallon. Tar salts, 17s. 6d. per ton. Anthracene (30 per cent.), "A" quality, 1s. 2d. per unit; "B," 1s., according to quality.

Ammonia Products.—Notwithstanding the continued low price of nitrate, sulphate is looking up; and buyers are anxious to make contracts for forward delivery. The spot market is decidedly strong; and important sales have been noted during the week at prices varying from £11 17s. 6d. to £12. Liquor ammonia, is in fairly good demand at 1⅞d. Carbonate is slow of sale at 3d. to 3¼d.; whilst muriate, brown, at £18 10s., and white at £23, finds a ready market. Sal-ammoniac, is nominally at £30 to £32. Gas liquor (5° Twaddel), is quoted at 8s. per ton, with a rise or fall of 1s. 6d. per degree.

HALESOWEN GAS-WORKS.—A new set of wrought-iron annular condensers is being erected at the Halesowen Gas-Works, by Messrs. R. and J. Dempster, of Manchester.

CHELSEA WATER-WORKS COMPANY.—In their report to be presented at the meeting of shareholders next Thursday, the Directors of this Company recommend a dividend at the rate of 9½ per cent. per annum for the half year ended March last.

BURSTING OF A RESERVOIR AT EDMONTON.—An Edmonton correspondent of a daily contemporary reports the bursting, last Saturday, of one of the reservoirs of the New River Company. At Edmonton the roads and streets were submerged to a depth of 2 or 3 feet; and the ground floors of some hundreds of houses were rendered uninhabitable. No personal casualties are reported; but the damage to property is considerable.

THE REGISTRATION OF PLUMBERS.—Last Tuesday, a deputation from the Master, Warden, and Court of the Registration Committee of the Plumbers' Company and from the Operative Plumbers' Association of Great Britain and Ireland, accompanied by representatives of several corporations and trade lodges, and by members of Parliament interested in the matter, waited upon Mr. Ritchie, at the Local Government Board, to solicit his help in advancing the movement for the registration of plumbers.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 1081.)

Issue.	Share	When ex-Dividend.	Dividend of Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	11 Apr.	10½	Alliance & Dublin 10 p. c.	10	18—19	..	5 10 6
100,000	10	„	7½	Do. 7 p. c.	10	13—14	..	5 7 2
800,000	100	2 Jan.	5	Australian (Sydney) 6% Deb.	100	111—113	..	5 8 6
100,000	20	30 May	10	Bahia, Limited	20	23—25*	..	8 0 0
200,000	5	15 May	7½	Bombay, Limited	5	7—7½	−¼	5 0 0
40,000	5	„	7½	Do. New	4	5—5½	..	5 9 1
380,000	Stck.	14 Feb.	11½	Brentford Consolidated	100	229—234	..	5 0 5
125,000	„	„	8½	Do. New	100	167—172	..	5 1 9
220,000	20	14 Mar.	10½	Brighton & Hove, Original	20	43—45	..	4 13 4
320,000	20	28 Mar.	11½	British	20	45—47	..	4 15 9
50,000	10	14 Mar.	11	Bromley, Ordinary 10 p. c.	10	20—22	..	5 0 0
39,000	10	„	8	Do. 7 p. c.	10	13½—14½	..	5 10 4
328,750	10	30 May	10	Buenos Ayres (New) Limited	10	16—17*	..	5 17 9
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	107—110	..	5 9 1
150,000	20	28 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	11 Apr.	13½	Commercial, Old Stock	100	268—273	..	5 0 8
180,000	„	„	10½	Do. New do.	100	213—218	−1	4 18 8
180,000	„	28 Dec.	4½	Do. 4½ p. c. Deb. do.	100	123—128	..	3 10 3
557,320	20	13 Dec.	13	Continental Union, Limited	20	47—49	..	5 6 2
242,680	20	„	13	Do. New '69 & '72	14	33—34	..	5 6 7
200,000	20	„	10	Do. 7 p. c. Pref.	20	38—40	..	5 0 0
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	204—208	..	4 16 2
234,060	10	30 Jan.	13	European, Limited	10	25½—26½	..	4 18 1
120,000	10	„	13	Do. New.	7½	17½—18½	..	5 5 3
354,060	10	„	13	Do. do.	5	12½—13½	..	4 16 3
5,468,600	Stck.	14 Feb.	13	Gaslight & Coke, A, Ordinary	100	257—261	+½	4 19 8
100,000	„	„	4	Do. B, 4 p. c. max.	100	100—105	..	3 16 3
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	100	256—261	..	3 16 7
80,000	„	„	5	Do. F, 5 p. c. Prf.	100	123—128	..	3 18 1
60,000	„	„	7½	Do. G, 7½ p. c. do.	100	182—187	..	4 0 4
1,300,000	„	„	7	Do. H, 7 p. c. max.	100	165—170	..	4 2 2
468,000	„	„	10	Do. J, 10 p. c. Prf.	100	255—260	..	3 16 11
1,051,150	„	13 Dec.	4	Do. 4 p. c. Deb. Stk.	100	119—122	..	3 5 2
294,850	„	„	4½	Do. 4½ p. c. do.	100	125—130	..	3 9 3
650,000	„	„	6	Do. 6 p. c. do.	100	171—176	..	3 8 7
3,600,000	Stck.	15 May	10	Imperial Continental	100	205—209	+1	4 15 8
75,000	5	13 Dec.	6	Malta & Mediterranean, Ltd	5	5—5½	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p.c. Deb.	100	113—115	..	4 6 11
541,920	20	29 Nov.	6	Monte Video, Limited	20	19½—20½	..	5 17 1
150,000	5	30 May	10	Oriental, Limited	5	9½—9¾	−¼	5 2 7
60,000	5	28 Mar.	7	Ottoman, Limited	5	6½—6¾	..	5 3 8
166,870	10	16 Jan.	4	Pará, Limited	10	5½—6	..	6 13 4
420,000	100	2 May	6	People's Gas of Chicago—1st Mtg. Bds.	100	103—107	..	5 12 1
500,000	100	1 June	6	2nd Do.	100	95—100*	+1	6 0 0
100,000	10	26 Apr.	10	San Paulo, Limited	10	16—17	..	5 17 8
500,000	Stck.	28 Feb.	16½	South Metropolitan, A Stock	100	317—322	..	5 0 11
1,350,000	„	„	12½	Do. B do.	100	237—242	−1	5 0 2
141,500	„	„	13½	Do. C do.	100	260—270	..	4 18 1
600,000	„	28 Dec.	5	Do. 5 p. c. Deb. Stk.	100	138—141	+1	3 10 11
60,000	5	28 Feb.	11½	Tottenham & Edm'ntn, Orig.	5	11—13	..	4 8 5
						*Ex div		
				WATER COMPANIES.				
717,467	Stck.	28 Dec.	9½†	Chelsea, Ordinary	100	267—272	+2	3 9 10
1,720,560	Stck.	11 Apr.	7½	East London, Ordinary	100	305—309	+1	3 11 9
700,000	50	13 Dec.	9	Grand Junction.	50	122—126	..	3 11 5
708,000	Stck.	14 Feb.	10½	Kent	100	272—277	..	3 15 9
1,043,800	100	28 Dec.	9	Lambeth, 10 p. c. max.	100	252—257	..	3 10 0
406,200	100	„	7½	Do. 7½ p. c. max.	100	300—305	+1	3 18 2
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	118—120	..	3 6 8
500,000	100	14 Feb.	12½	New River, New Shares	100	350—355	+2	3 8 4
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	100	126—129	..	3 2 0
902,300	Stck.	13 Dec.	6	S'thwk & V'xhall, 10 p.c. max.	100	174—178	−1½	3 7 5
126,500	100	„	6	Do. 7½ p. c. do.	100	164—169	..	3 11 0
1,155,066	Stck.	13 Dec.	10	West Middlesex	100	266—271	..	3 13 10

† Next dividend will be at this rate.

GWYNNE & CO., ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS & ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

Exhausters of nearly all sizes in Stock.

Prize Medals at all the Great International Exhibitions.

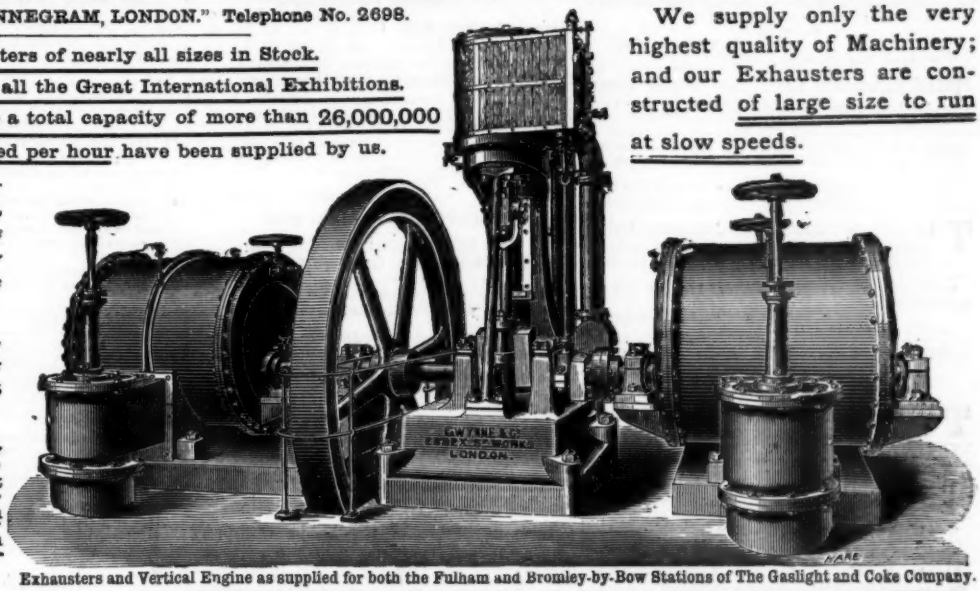
Exhausters equal to a total capacity of more than 26,000,000 cubic feet passed per hour have been supplied by us.

Our new Patent Non-Fluctuating Exhausters, to work without the slightest oscillation or variation in pressure, are strongly recommended.

MAKERS OF EVERY DESCRIPTION OF HYDRAULIC AND GAS MACHINERY.

Gwynne & Co.'s New Catalogue and List of Testimonials can now be obtained on application.

We supply only the very highest quality of Machinery; and our Exhausters are constructed of large size to run at slow speeds.



Exhausters and Vertical Engine as supplied for both the Fulham and Bromley-by-Bow Stations of The Gaslight and Coke Company.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

ANDREW STEPHENSON, Agent for the GAS PURIFICATION AND CHEMICAL COMPANY, Limited, Palmerston Buildings, Old Broad Street, LONDON, E.C.

CANNEL COAL, &c.

JOHN ROMANS & SON, EDINBURGH.
Gas Engineers, supply all the most approved COTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND
No. 54, BERNARD STREET, LEITH, }

SULPHATE of Ammonia Lead Work and Fittings. Lead Burner. Tanks and Saturators made and repaired on the shortest notice.
Address P. J. DAVIES, 78, Earl's Court Road, Kensington, LONDON.

SULPHURIC ACID, B.O.V., for Sulphate of Ammonia Making. Guaranteed clear, of full strength, and to produce a fine white-coloured salt, Delivered in carboys or railway tank waggons.
For prices and terms address BALE, BAKER, AND Co., 120 & 121, Newgate Street LONDON.

SHIPPING AND INSURANCE.

ROBERT BRUCE FITZMAURICE, 9, Crosby Square, London, E.C., Shipping Agent to several Foreign Gas Companies, is prepared to attend to the Forwarding and Insurance of Goods for Foreign and Colonial Gas Companies, &c., and Gas Plant Manufacturers.
For Rates of Freight, apply as above.

ADVERTISER, nearly Eleven years Clerk to the late Mr. R. P. Spice, and also Secretary to a Company, is seeking EMPLOYMENT.
Address JOHN WATKINSON, 21, PARLIAMENT STREET, S.W.

SITUATION wanted, as Manager of small Gas-Works. Many years' experience both in England and America. First-class References.
Address No. 1715, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at a Gas-Works a young MAN, aged 20 to 23, used to Service Laying, Fixing Meters, and willing to be useful on Works. Wages £1 per week.
Apply to Mr. J. S. WHEELER, Manager, Gas-Works, Bromsgrove, WORCESTERSHIRE.

WANTED, for a Gas-Works making 25 millions, a good WORKING FOREMAN. Must be a good Carboniser, and competent to do the Fitting inside and outside the Works, and also Rough Smithing. Those able to do Retort Setting will be preferred. This would suit a man who has held a similar position in a smaller Works. None but strictly sober men need apply. Wages 35s. per week; an increase would depend on the man.
Apply in first place, with testimonials as to character, &c., to No. 1713, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TIMMIS & CO., of STOURBRIDGE Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats. All descriptions kept in Stock.
For Prices apply to JAMES LAWRIE AND Co, 1, Whittington Avenue, Leadenhall Street, E.C., Sole Agents for London and District.
Telegraphic Address: "EIRWAL, LONDON."

ALEX. WRIGHT & Co., 55, 55a, and 56, MILLBANK STREET, LONDON, S.W.
[Telegraphic Address: "PRECISION LONDON."]
Makers of Wet and Dry Gas-Meters, Station Meters and Governors, Photometers, and Gas-Testing Apparatus, Test Gasholders and Meters, Registering and other Gauges, &c., &c.
*** See Advertisement on Page III. of the Wrapper of last week's issue.

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Setting.
*** See Advertisement p. 1111 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award. Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

STEAM-JET PUMPS.

MELDRUM Bros., Engineers, of 26, Half Street, Cathedral Yard, Manchester, make and supply STEAM-JET ELEVATORS for Gas Liquor, Sulphuric Acid, Water, &c., specially proportioned for working conditions. Increase of temperature under 1° Fahr. per foot vertical for Water. Prices on application.

MILFORD IMPROVEMENT ACT, 1857.

CLERK of Works, experienced in every detail of Gas-Works Erection, required for about four months, from the 24th of June, 1889, to supervise the erection of NEW GAS-WORKS at Milford Haven. Salary £2 10s. per week, to include supervision of overtime work (if any).
The person appointed will be required to devote his whole time to his duties as Clerk of the Works, and will be required to be on the Works at all times when work is being executed.
Applications, addressed to the Chairman of Commissioners, Milford Haven, and endorsed "Clerk of Works," together with testimonials, must be sent in on or before Wednesday, the 19th of June, 1889.
Further particulars on application to the undersigned.

PEREGRINE THOMAS,
Clerk to the Milford Improvement Commissioners.

Commissioners' Offices,
Milford Haven, May 28, 1889.

WANTED—Any Gas Company having for Sale one LIVESEY WASHER, and one KIRKHAM'S SCRUBBER for 500,000 feet per day, will please communicate with Mr. LONGWORTH, Gas Offices, GUILDFORD.

FOR SALE—Tar Stills, in sound con- dition. Distilling capacity, 8 to 18 tons. STEAM PUMP, 5-inch Ram, double-acting. ANTHRACENE FILTER PRESSES.
Address CULPAN AND SONS, Heckmondwike, YORKSHIRE.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.
120 and 121, NEWGATE STREET, LONDON, E.C.

TUBES.

FOR Gas, Steam, and Water; Galvanized, White Enamelled, and Hydraulic Tubes and Co.
JOHN SPENCER, Globe Tube Works, WEDNESBURY, and 14, Great St. Thomas Apostle, LONDON.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour *delivered in Carboys or Railway Tank-Wagons.*
Highest References and all particulars supplied on application.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

HUTCHINSON BROTHERS, Barnsley, Gas Engineers and Contractors, Makers of Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Tools, and Sundries.
*** See large Advertisement in last week's issue, page 1029.

GAS CARBON FOR SALE.

THE Maidstone Gas Company has about 15 tons of GAS CARBON for Sale.
Apply to the MANAGER.

FOR SALE—Freehold Manufacturing PREMISES in Birmingham. Price £8000, one-half of which may remain on Mortgage. Has good Shopping, with 6-horse power Steam-Engine and Cornish Boiler; also Blacksmith's Shop and Stores, and spare Land sufficient to develop a large Business. Situated on a Main Road, midway between the Stations of two Railway Companies; about five minutes' walk from either.
Apply, by letter, to No. 1714, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—The Directors of the Ilkley Gas Company have FOR SALE:
One GAS SCRUBBER, 21 ft. by 4 ft. 6 in., filled with Boards; in good condition.
One KIRKHAM AND HULETT'S PATENT GAS WASHER; capacity, 12,000 cubic feet per hour.
One KORTING'S STEAM-JET EXHAUSTER, 5000 cubic feet per hour.
May be seen at work, and will be removed shortly for alterations and enlargements.
For further particulars, apply to the MANAGER, Gas-Works, Ilkley, YORKS.

NELSON LOCAL BOARD.

THE Nelson Local Board Gas Committee invite TENDERS for the supply of 11,000 tons of GAS COAL, to be delivered at the Lancashire and Yorkshire Railway Siding, or at the Leeds and Liverpool Canal Wharf.
Conditions and forms of tender may be obtained from Mr. Wm. Foster, Gas Engineer, Nelson.
Sealed tenders to be addressed to the Chairman of the Gas Committee, endorsed "Gas Coal," and sent or delivered to me not later than the 26th inst.

By order,
R. M. PRESCOTT,
Clerk to the Board.

Town Hall, Nelson,
Lancs., June 3, 1889.

COUNTY BOROUGH OF SALFORD.

THE Gas Committee propose to hold an EXHIBITION OF GAS HEATING AND COOKING STOVES, GAS-BURNERS, &c., in Peel Park, Salford, about the beginning of July.

APPLICATIONS FOR SPACE from Persons desirous of exhibiting to be made to the Gas Engineer, Gas Offices, Bloom Street, Salford.

By order,
SAML. BROWN, Town Clerk.

Town Hall, Salford, June 7, 1889.

THE Knutsford Light and Water Company are prepared to CONTRACT for 1100 tons of GAS COAL or NUTS, and 200 tons of CANNEL; the whole to be screened and free from all objectionable matter, and to be delivered, carriage free, at Knutsford Station, between July 1, 1889, and July 1, 1890, as required.

Tenders to be sent in on or before Tuesday, the 18th of June, to the Chairman of the Company, Knutsford.

THE Isle of Thanet Gas Company invite TENDERS, to be delivered on or before Tuesday, June 18, 1889, for the supply of 9300 tons of the best Seaborne GAS COAL.

Particulars and times of delivery may be had on application to

THOMAS C. FULLER, Secretary.

Gas-Works, Margate, May 24, 1889.

CAMBRIDGE UNIVERSITY AND TOWN GAS-LIGHT COMPANY.

TO TAR DISTILLERS AND OTHERS.

THE Directors of this Company will, at their Meeting on June 20, be prepared to receive TENDERS for the surplus TAR and the whole of the AMMONIACAL LIQUOR produced at these Works, for a period of One year, from July 1 next ensuing.

Further particulars may be had from the undersigned.

JAMES WEEKS, Manager.

Gas-Works, Cambridge, May 23, 1889.

TENDERS FOR GAS COAL.

THE Directors of the Victoria New-market Gaslight and Coke Company, Limited, invite TENDERS for the supply of best screened GAS COAL, for One or Two years, commencing the 1st of July next. The quantity required will be about 4000 tons annually.

Tenders, stating price per ton, delivered free at Newmarket Station as required, to be sent to the undersigned on or before June 15, 1889, from whom any further particulars may be obtained.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
THOMAS WILKINSON,
Manager and Secretary.

Gas-Works, Newmarket,
May 25, 1889.

CORPORATION OF HEREFORD.

TENDERS FOR YORKSHIRE GAS COAL.

THE Gas Management Committee of the Hereford Corporation are prepared to receive TENDERS for the supply of about 1000 tons per annum of best screened YORKSHIRE SILKSTONE GAS COAL, for a period of One, Two, or Three years, commencing from the 1st of August next.

Parties tendering are to quote a price per ton of 20 cwt. for the Coal delivered, carriage paid, in Colliery or Corporation wagons, on the Gas-Works Siding (Great Western Railway), Hereford.

Sealed Tenders, marked "Tender for Gas Coal," to be addressed to the Chairman of the Gas Management Committee, Mansion House, Hereford, on or before the 15th of June.

Further particulars and form of tender may be had on application to the undersigned.

The Committee do not bind themselves to accept the lowest or any tender.

WILLIAM PARLBY, Gas Engineer.

Gas-Works, Hereford, May 31, 1889.

TO TAR DISTILLERS.

THE Dukinfield Local Board (Gas De-partment) require OFFERS for the TAR produced at the Works for One year from the 1st of July next.

For particulars apply to

HARRISON VERVERS, C.E.,
Engineer and Manager.

Gas-Works, Dukinfield,
May 31, 1889.

DARWEN CORPORATION GAS-WORKS.

THE Gas Committee of the above Cor-poration are prepared to receive TENDERS for the supply of WET AND DRY GAS-METERS.

Particulars from the undersigned.

Sealed tenders, endorsed "Meters," to be delivered to C. Costeker, Esq., Town Clerk, Darwen, not later than Ten a.m., June 18, 1889.

By order,
THOS. DUXBURY, Manager.

BOROUGH OF WORKINGTON.

TAR AND AMMONIACAL LIQUOR.

THE Workington Corporation are pre-pared to receive TENDERS for the surplus TAR and the whole of the AMMONIACAL LIQUOR produced at their Works during the year ending June 30, 1890.

Any further particulars required can be obtained on application to the Engineer, Mr. Herbert Lees, at the Gas-Works.

Tenders, endorsed "Tender for Tar and Ammoniacal Liquor," to be sent to the undersigned not later than the 24th inst.

The Corporation do not bind themselves to accept the highest or any tender.

JOHN WARWICK, Town Clerk.

Town Hall, June 6, 1889.

THE SHREWSBURY GASLIGHT COMPANY.

DISPOSAL OF SURPLUS TAR.

THE Directors of the above Company are desirous of receiving TENDERS for the purchase of the surplus TAR made at their Works during the Twelve months commencing July 1, 1889.

The estimated quantity for disposal is about 750 tons per Annum.

Forms of tender, containing all further particulars, may be obtained on application at the Company's Works, or by post.

Tenders to be sent in to the undersigned not later than the 15th day of June, 1889.

The Directors do not bind themselves to accept the highest or any tender.

By order,
WM. BELTON, Assoc. M. Inst. C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
May 16, 1889.

THE SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gas-light Company invite TENDERS for the supply of best screened GAS COALS, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the Twelve months commencing July 1, 1889.

About 10,000 tons per Annum will be required under the contract.

The Directors reserve to themselves the right to divide the quantity into two or more contracts, and do not bind themselves to accept the lowest or any tender.

Forms of tender, containing all further particulars, may be obtained on application at the Company's Works, or by post.

Tenders to be sent to the undersigned on or before the 15th day of June, 1889.

By order,
WM. BELTON, Assoc. M. Inst. C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
May 16, 1889.

FENTON URBAN SANITARY DISTRICT.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works, for a period of One year, commencing the 1st of July next.

Sealed tenders, addressed to J. Gimson, Esq., Chairman of the Gas-Works, to be sent in not later than the 18th day of June, 1889.

Form of tender and further information may be obtained on application to the undersigned.

F. H. DARWIN, Manager.

Gas Offices, Fenton,
Staffordshire May 22, 1889.

TENDERS FOR COAL.

THE Corporation of Batley are prepared to receive TENDERS for the supply and delivery at their Gas-Works of 10,000 tons of GAS COAL.

Conditions and form of tender may be obtained on application to the Manager, at the Gas-Works.

The Corporation do not bind themselves to accept the lowest or any tender, and may accept any tender for a part only of the specified quantity.

Sealed tenders, addressed to me, and endorsed "Gas Coal," to be delivered at my Office on or before Saturday, the 15th day of June inst.

J. H. CRAIK, Town Clerk.

Town Clerk's Office, Batley,
June 7, 1889.

TO TAR DISTILLERS AND OTHERS.

THE Leek Improvement Commissioners invite TENDERS for the purchase of the surplus TAR produced at their Gas-Works for One, Two, or Three years from the 1st of July, 1889, at per ton of 2240 lbs. at the Works.

Further particulars may be obtained from Mr. Norfolk, Gas Manager, or the undersigned.

Sealed and endorsed tenders, addressed to the Chairman of the Gas Committee, Town Hall, Leek, must be delivered before Four o'clock in the Afternoon of Monday, the 24th of June inst.

The highest or any tender will not necessarily be accepted.

By order of the Commissioners,
C. HENSHAW, Clerk.

Town Hall, Leek, June 7, 1889.

TIPTON GAS-WORKS.

COAL CONTRACTS.

THE Gas Committee of the Tipton Local Board invite TENDERS for the supply of GAS COAL, for a period of One, Two, or Three years from the 1st of July next, to be delivered as required, carriage free, to the Gas-Works Sidings (London and North-Western Railway Company).

Specification and form of tender may be obtained at the Gas-Works on application to the undersigned.

Sealed and endorsed tenders to be sent to Mr. G. M. Waring, Clerk to the Board, on or before the 22nd of June.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
VINCENT HUGHES,
Engineer and Manager.

Gas Offices, Tipton, June 6, 1889.

TIPTON GAS-WORKS.

CONTRACT FOR RETORTS.

THE Gas Committee of the Tipton Local Board will be pleased to receive TENDERS for the supply of FIRE-CLAY RETORTS, &c.

Specification and form of tender may be obtained at the Gas-Works on application to the undersigned.

Sealed tenders to be sent to Mr. G. M. Waring, Clerk to the Board, on or before the 22nd of June, endorsed "Tender for Retorts."

The Committee do not bind themselves to accept the lowest or any tender.

By order,
VINCENT HUGHES,
Engineer and Manager.

Gas Offices, Tipton, June 6, 1889.

C. & W. WALKER.

GASHOLDERS; PURIFIERS;
PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

SULPHATE & SULPHUR PLANT;

RETORT MOUTHPIECES; CONDENSERS;

LIFTING APPARATUS; CENTRE AND FOUR-WAY VALVES;

SLIDE VALVES; TAR BURNERS; &C., &C.,

WOOD SIEVES.

ADDRESSES:

8, Finsbury Circus, London, E.C.; Midland Works, Donnington, Salop

"FORTRESS LONDON," "FORTRESS DONNINGTON,"—Telegraphic.

TO TAR DISTILLERS.

THE East Retford Corporation Gas Committee require OFFERS for their surplus TAR and AMMONIACAL LIQUOR for One year, from July 1 next.

For particulars apply to

F. Bailey, Manager.

THE Cleckheaton Local Board hereby invite TENDERS for the supply of an 18-inch COMPENSATING GAS GOVERNOR, together with Valves and Bye-Pass Arrangement, any further particulars of which may be obtained from their Manager, Mr. Niven.

Tenders, suitably endorsed, to be deposited with the undersigned before Tuesday, the 25th inst.

By order,
J. Armitage, Clerk.

Cleckheaton, June 5, 1889.

BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Halifax Corporation are prepared to receive TENDERS for the supply of WROUGHT-IRON TUBING for a period of Twelve months.

Forms of tender and further information may be obtained on application to Mr. Thomas Holgate, F.C.S., Engineer, Gas-Works, Halifax.

Tenders, endorsed "Tubing," must be sent to the undersigned on or before Thursday, the 20th of June inst.

By order,
Keighley Walton, Town Clerk.

Town Hall, Halifax, June 7, 1889.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Ossett Gas Company are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR (Strength of Liquor to be specified) and surplus TAR produced at their Works during the next Twelve months.

Cash payments monthly.

The Tar and Liquor to be removed by the Contractors whenever required by the Company's Manager.

The Directors do not bind themselves to accept the highest or any tender.

Sealed tenders to be sent in not later than Wednesday, the 19th inst.

By order,
Jas. Castle, Secretary.

Ossett, June 6, 1889.

THE Hindley Local Board are prepared to receive TENDERS for the purchase of the TAR and AMMONIACAL LIQUOR produced at their Gas-Works during the ensuing Twelve months.

Full particulars, with form of tender, can be obtained on application to Mr. W. Dickinson, Gas and Water Manager.

Sealed tenders, endorsed "Tender for Tar, &c.," to be lodged with the undersigned not later than Monday, June 24, 1889.

By order,
Stephen Holt,
Clerk to the Local Board.

Offices: Cross Street,
Hindley, June 6, 1889.

TO CONTRACTORS.

THE Market Harborough Gas Company invite TENDERS for—

Four New PURIFIERS. Plans and specifications to be seen at the Works.

20 tons of OXIDE OF IRON for Purification.

30 tons of SULPHURIC ACID. Particulars at the Works.

2000 tons of screened GAS COAL.

100 tons of LIME.

The foregoing to be delivered at Market Harborough Station.

Also FOR SALE from 15 to 20 tons of SPENT OXIDE. Samples on application.

Tenders to be marked and sealed, and sent to the undersigned by the 26th inst.

C. Burgoine, Secretary.

June 3, 1889.

LINCOLN CORPORATION.
(Gas Department.)

THE Gas Committee of the Corporation of Lincoln are prepared to receive TENDERS for the purchase of the surplus TAR, and of the whole of the AMMONIACAL LIQUOR produced at their Works during a period of One year, commencing July 1 next.

Information as to quantities and other particulars may be obtained of the Manager, Mr. John Carter.

Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Residuals," must be delivered at the Gas Offices, Newland, on or before the 22nd inst.,

The Committee do not bind themselves to accept the highest or any tender.

H. K. Hebb,
Deputy Town Clerk.

Lincoln, June 4, 1889.

BOROUGH OF BRADFORD.

TO COLLIERY PROPRIETORS.

THE Gas and Electricity Supply Committee of the Bradford Corporation are prepared to receive TENDERS for the supply of best GAS COAL and CANNEL, both to be well screened, dressed, and free from Shale and Pyrites; to be delivered at the several Works of the Corporation, in the Borough, during the period of One year, commencing on the 1st day of August next, in such quantities weekly as may be agreed upon.

Form of tender, with any further information required, may be had on application to Mr. Swallow, at the Gas Offices, Town Hall.

Sealed tenders, endorsed "Tender for Coal," to be delivered to me on or before Saturday, the 29th inst.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
W. T. M'Gowen, Town Clerk.

Town Hall, Bradford, June 7, 1889.

THE GAS INSTITUTE

TWENTY-SIXTH
ANNUAL MEETING

June 18th, 19th, & 20th, 1889.

GEORGE GARNETT, M. Inst. C. E.,

President, pro tem.,

WILL OCCUPY THE CHAIR.

Notice is Hereby Given that the ANNUAL GENERAL MEETING of the Institute will be held at the SHIP HOTEL, BRIGHTON, on MONDAY, the 17th of JUNE next, at Twelve o'clock noon, and afterwards, by adjournment, at the INSTITUTION OF CIVIL ENGINEERS, No. 25, Great George Street, in the City of Westminster, on TUESDAY, the 18th of June, and following days, at Eleven o'clock in the forenoon, for the transaction of the ordinary business of the Institute;

And Notice is Hereby further Given that the said Adjourned General Meeting of the 18th of June will, after the confirmation of Minutes, Council's Report, and the Election of Officers and New Members, be declared an EXTRAORDINARY GENERAL MEETING for the following purposes:

1.—To elect three new Trustees in the place of Messrs. William Foulis, George Livesey, and Thomas Newbigging.

2.—To consider, and, if approved, adopt, a resolution which will be submitted to the Meeting—"That the Council be empowered to relegate to the 'Associate Members' and 'Associate' classes every Extraordinary and Ordinary Member whose qualification is not in strict accordance with Rule 3 of the existing Rules of the Institute."

3.—To consider, and, if approved, adopt certain propositions for altering Rules 2, 3, 6, 8, 9, 13, 15, 16, 19, 21, 23, 25, 26, 27, 28, 29, 30, 31, 36, 37, 39, 40, 44, 48, and 49 of the Rules of the Institute; for adding two new Rules thereto; and for striking out Rules 10, 34, and 43—a draft of which proposed alteration has already been submitted to the Members.

N.B.—After the consideration of the above special business has been concluded, the rest of the ordinary business of the Annual General Meeting will be proceeded with.

Notice is also Hereby Given that, after the conclusion of the above Meeting, on Tuesday, June 18th, an EXTRAORDINARY GENERAL MEETING of the Donors and Subscribers to the Benevolent Fund of the Institute will be held, for the purpose of electing two new Trustees in the place of Messrs. George Livesey and Thomas Newbigging.

William Longworth,
Hon. Sec., *pro tem.*

Guildford, May 30th, 1889.

ORDER OF PROCEEDINGS.

Institution of Civil Engineers,

25, Great George Street, Westminster,
London, S.W.

JUNE 18th, 19th, and 20th, 1889.

THE CHAIR WILL BE TAKEN AT 11 A.M. DAILY.

Confirmation of Minutes of last General Meeting. Appointment of Scrutineers. Presentation of the Report of the Council. Inaugural Address by the President, *pro tem.* Presentation of Awards. Scrutineers' Report. Meeting declared Extraordinary, or Special General Meeting—Business, Nos. 1, 2, and 3, enclosed. Meeting declared Ordinary General. Papers to be submitted to the Meeting:—

"On the Construction, Setting, and Working of Gas-Retorts, and on the Pipe Appendages connected therewith."—George Anderson, London.

"Experience in the Manufacture of Oxygen in Gas-Works, and the result of its Practical Application to the Purification of Coal Gas."—W. A. Valon, Ramsgate.

"A History of a Heap of Oxide."—N. H. Humphrys, Salisbury.

"Purifiers."—George Anderson, London.

The Meetings will adjourn daily from One to Two p.m. for Luncheon.

Annual General and Special General Meeting of the Donors and Subscribers to the Benevolent Fund at conclusion of above business, Tuesday, June 18th, 1889.

General Business.
Election of Trustees.

William Longworth,
Hon. Sec., *pro tem.*

Guildford, Surrey, May 30th, 1889.

NEWARK GAS COMPANY.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Directors of the above Company are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR produced at their Works, for One year, from the 30th day of June, 1889, per degree Twaddel; the Liquor to be not less than 5° in Strength.

Terms, cash monthly.

Further particulars can be had on application to the Secretary, at the Company's Offices, to whom sealed tenders, marked on the outside "Tender for Liquor," are to be sent before the 18th inst.

The highest tender will not be necessarily accepted.

By order,
Frede. B. Foottit,
Deputy-Secretary.

Newark, June 7, 1889.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Newark Gas Company are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works, for One year, from the 30th day of June, 1889.

Terms, cash monthly.

Further particulars can be obtained on application to the undersigned, to whom sealed tenders are to be sent on or before the 18th inst., marked on the outside "Tender for Tar."

The Directors do not bind themselves to accept the highest or any tender.

By order,
Frede. B. Foottit,
Deputy-Secretary.

Newark, June 7, 1889.

CORPORATION OF BANGOR.

SUPPLY OF GAS COAL.

THE Gas Committee of the above Corporation invite TENDERS for the supply of 1700 tons of GAS COAL and 50 tons of first-class CANNEL, to be delivered at the Bangor Railway Station (L. & N. W. R.), or by Ship on the Beach at Hirael. The Beach is well sheltered, and has a good level surface.

The Coal must be a good Colliery Coal, well screened, and free from Bats, Pyrites, or other Impurities.

Form of tender may be had on application to the undersigned, to whom sealed tenders, endorsed "Tender for Coal or Cannel," are to be sent not later than June 21, 1889.

The Committee do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to divide the contract between two Firms.

John Smith, Manager.

Bangor, June 6, 1889.

BOROUGH OF MACCLESFIELD.

THE Gas Committee are prepared to receive TENDERS for the supply of the under mentioned MATERIALS required during a period o Twelve months, commencing July 1, 1889, viz.:—

(1.) Wrought-Iron Lap-welded STEAM TUBES and FITTINGS.

(2.) The best hand-picked BURTON LIME, delivered fresh at Macclesfield, free from Dirt and Ashes, in such quantities as may be ordered.

(3.) Cast-Iron MAINS and IRREGULARS.

Forms of tender, &c., may be obtained on application to Mr. Moore, Engineer, Gas-Works.

Sealed tenders, properly endorsed, to be addressed to the Chairman, Gas Committee, Town Hall, Macclesfield, and to be sent in not later than Saturday, the 22nd of June, 1889.

The Committee do not pledge themselves to accept the lowest or any tender.

(Signed) W. Frede. Taylor,
Town Clerk.

June 4, 1889.

TENDERS FOR GAS COALS.

THE Gas Committee of Limerick are prepared to receive TENDERS for the supply of either 7000 tons or 14,000 tons of any of the undermentioned GAS COALS:—Pelaw Main, Pelton Main, New Pelton, Holmside, Ravensworth Pelaw, or West Leversons.

Subject to the following Conditions:—

1st.—The Coal must be of the best quality, fresh wrought, and shipped through and through.

2nd.—Forty-eight hours before any Coal is put on board, an advice must be sent by post to the Gas Manager in Limerick, stating the name of the Vessel, and when and where she is to load.

3rd.—The Coal must be delivered, and stowed where directed, in good condition, direct from the Vessel, into the Gas-Works at the Dock Road, free of all Charges.

4th.—1000 tons, subject to an average margin of 5 per cent., to be delivered in each of the following months:—

For 7000 tons contract—August, October, November, December, 1889; January, February, and April, 1890.

For 14,000 tons contract.—August, October, November, December, 1889; January, February, April, August, October, November, December, 1890; January, February, and April, 1891.

5th.—In the event of strike in the Colliery selected, the Contractor will be bound to supply any of the other Coals named above at the option of the Gas Committee at the contract price, and subject to all the conditions herein contained; and in the event of all the Collieries named being on strike at the same time, the Contractor will be bound to deliver, subject to all the conditions herein specified, some first-class Gas Coal to be named by the Gas Committee, at a price to be fixed by arbitration in the usual way, provided the Contractor and the Gas Committee are unable to agree as to same.

6th.—The Committee will reject any Cargo unless all the above conditions have been strictly complied with.

7th.—Payment, net cash, on delivery of each Cargo.

8th.—The Committee will decide on the day of making the contract which Coal is to be supplied.

9th.—Tenders, under seal, addressed to the Gas Committee, 34, William Street, Limerick, and marked "Tender for Gas Coal," will be received up to Three o'clock, p.m., on Monday, June 24, 1889.

10th.—All tenders not in strict conformity with this advertisement will be rejected; and the Committee do not bind themselves to accept the lowest or any tender.

Limerick, June 4, 1889.

JUST PUBLISHED.

EDITED BY CHARLES W. HASTINGS.

The Gas & Water Companies' Directory, 1889.
Demy 8vo, 270 pp., Cloth Boards, 5s., Post Free.

GAS-WORKS STATISTICS, 1889.
Demy 8vo, Stiff Covers, 104 pp., 3/6, Post Free.

WATER-WORKS STATISTICS, 1889.
Demy 8vo, Stiff Covers, 40 pp., 2/6, Post Free.

The above Three Works, Handsomely Bound in Cloth, in One Volume,

PRICE 10S. POST FREE.

These Books have been thoroughly revised to date, and contain much valuable and additional information. PROSPECTUS, giving SPECIMEN PAGES AND PRESS OPINIONS, post free on application to the Publishers,

HAZELL, WATSON, & VINEY, LTD.,
1, CREED LANE, LUDGATE HILL, LONDON, E.C.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

To effect a great saving in
GAS-FURNACES use our
Special Derbyshire **GANNISTER BRICKS.**
ADDRESS
JAMES WHITE & Co.,
ALBERT WORKS, WIDNES.

COKE BREAKERS,
FROM £14 EACH.
(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, S.E.

CAST-IRON PIPES
FOR GAS AND WATER.
VALVES
FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."
WM. MACLEOD & CO.,
56, ROBERTSON STREET, GLASGOW.

THE
LANEMARK COAL Co., LTD.,
Now offer their superior
GAS COALS

LANEMARK CANNEL.
Yield of Gas per ton . . 10,880 cub. ft.
Illuminating Power . . 29·21 candles.
Coke per ton . . . . 1266·96 lbs.

LANEMARK GAS COAL.
Yield of Gas per ton . . 11,379 cub. ft.
Illuminating Power . . 17·88 candles.
Coke per ton . . . . 1285·53 lbs.

LANEMARK GAS BRIQUETTES.
Yield of Gas per ton . . 10,734 cub. ft.
Illuminating Power . . 22·70 candles.
Coke per ton . . . . . 1320 lbs.

For Prices and Analyses, apply to
LANEMARK COAL Co., Ltd.,
NEW CUMNOCK, N.B.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers and rendering leakage impossible.

GAS AND WATER PIPES.
1½ to 12 IN. BORE.

THOMAS ALLAN & SONS,
Bon Lea Foundry,
SOUTH STOCKTON-ON-TEES.
ALSO MANUFACTURERS OF
SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.
GLASGOW OFFICE: 24, GEORGE SQUARE.

THOMAS TURTON AND SONS, LIMITED,
SHEAF AND SPRING WORKS
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING-JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE
BOGHEAD CANNEL.
Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

For Prices and complete Analysis, apply to
YOUNG, DANCE, & CO.,
COAL OWNERS, NEWCASTLE-ON-TYNE,
Or E. FOSTER & CO., 21, John St., Adelphi, LONDON, W.C.

GAS COAL.
POPE & PEARSON, LTD.,
have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12½ cwt. of good coke.
This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
For further particulars apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

THE
"SILVER" LIGHT.

CHANDLER'S PATENT.
SUITABLE FOR EVERY FORM OF LIGHTING.
A beautiful white light from ordinary Gas. Silent, steady, and economical.
PACKED IN BOX 9s., SUBJECT.
S. CHANDLER & SONS,
Central Works, Kennington Oval, S.E.

Jos. EVANS & SONS
WOLVERHAMPTON.

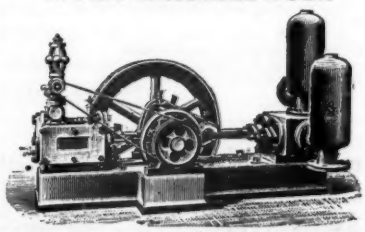


Fig. 685.—EVANS' Patent "RELIABLE" REVERSIBLE TAR and LIQUOR PUMP. The best Tar-Pump in the Market. Adopted by all the leading London and most of the Provincial Gas-Works; also on the Continent.
The Gaslight and Coke Company, Beckton, over 100 Pumps supplied.
Imperial Continental Gas Association, nearly 50 Pumps supplied.
South Metropolitan, Commercial, and Phœnix Gas Companies, London, H. M. War Office, &c.

NEW CATALOGUES ON APPLICATION.

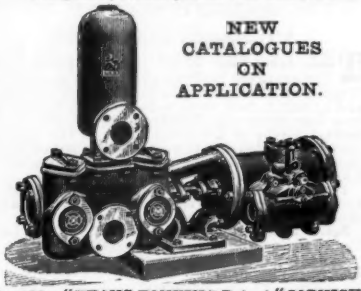


Fig. 600.—"EVANS-TONKIN" Patent "CORNISH" DIRECT-ACTING STEAM-PUMP. NO TAPPETS.

TROTTER, HAINES, & CORBETT,
BRETTELLS' ESTATE
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS TILES, and every description of FIRE-BRICK,
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAYS
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

THE DIFFERENTIAL POSITIVE
WATER-METER
COMBINES THE
Advantages of the Inferential and Positive Meters hitherto in use.
THE LONDON WATER-METER CO., LTD.
Offices: 2, Chancery Lane, London, E.C.
For Illustrated Advertisement, see JOURNAL, May 21, p. 997.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
MIRFIELD, NORMANTON.

THOMAS ILLINGWORTH,
NORTH DEAN CHEMICAL WORKS,
Near HALIFAX,
MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.
TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

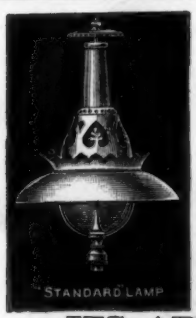
MARQUIS OF LOTHIAN'S
NEWBATTLE CANNEL.
QUOTATIONS ON APPLICATION TO
MR. JOHN MORISON,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THE ONLY RELIABLE
DRY CENTRE-VALVE.
WORKING ONE, TWO, THREE, OR FOUR PURIFIERS ON AT THE TIME.
ALSO MADE FOR TWO OR THREE PURIFIERS.
No Springing. No Leakage. No Foul Gas passed in Changing. Special Facility for Blowing the Air out of the Fresh Box before putting in Action, without driving it forward into the Holders.
Write for Prospectus.
ALSO DOUBLE-ACTION DOUBLE-FACED GAS & WATER VALVES.
F. WECK, 86, NEW STREET, BIRMINGHAM.

RUSCOE'S PATENT MACHINE
FOR DRILLING AND TAPPING WATER-MAINS AND GAS-MAINS UNDER PRESSURE.
Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in., 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.
Sole Maker of HELPS' PATENT PIPE EXTRACTOR.
Prices and Particulars on Application to
JOHN RUSCOE, Albion Works, Hyde, near Manchester.

CAST-IRON PIPES, ETC.
THOMAS SPITTLE, LTD.
[ESTABLISHED OVER 50 YEARS.]
CAMBRIAN FOUNDRY, NEWPORT, MON.,
MAKERS OF
CAST-IRON PIPES FOR GAS, WATER, AND STEAM.
ALSO
Retorts, Mouthpieces, Lamp-Posts, Hydraulic Mains, H-Pipes, Dip-Pipes, Buckstaves, Ash-pans, Sight-Holes, Syphons, Ascension-Pipes, Fire Doors and Frames, Fire-Bars, Hydrants, Valves, Purifiers, Tanks, Columns, &c., &c.
ALSO ALL WROUGHT-IRON WORK.
THE LARGEST MAKERS IN WALES.

"LIGHT, Wenham Gas Lamps MORE LIGHT."



ITS ADVANTAGES ARE:
IMMENSE ECONOMY IN THE CONSUMPTION OF GAS.
INTENSITY, PURITY, AND STEADINESS OF THE LIGHT.
Absence of Downward Shadow. *Practical Completeness of Combustion.*
CAN BE FITTED TO ORDINARY SUPPLY-PIPES WITHOUT ALTERATION.
CAN BE USED AS VENTILATING LIGHTS, whereby the products are removed, and damage to decorations, &c., prevented.

SOLE PROPRIETORS AND MANUFACTURERS: **THE WENHAM COMPANY, LIMITED.**
Birmingham Branch: 121, CORPORATION STREET. Works: UPPER OGLE ST., LONDON, W. Manchester Branch: 5, DEANSGATE.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE STREET, BIRMINGHAM—AGENT: A. C. SCRIVENER.

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Invite attention to the following Specialities:—

PATENT STREET LAMPS,

NO PUTTY OR OTHER MATERIALS ARE REQUIRED TO SECURE THE GLASS. PRICE 9s. 9d. EACH NET.

D. Hulett's Improved Service Cleanser, for the removal of Naphthalene and other obstructions in Service-Pipes. Price 70s. net.

IMPROVED HIGH-POWER LANTERNS; PRICES ON APPLICATION.

Patentees of Improved Wet and Dry Gas-Meters.

Makers of Pressure-Gauges, Gaseliers, and every kind of Gas-Fittings for the Trade.

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SPECIALITIES.

THE "NUGENT" RECUPERATIVE RETORT SETTINGS and FURNACES.

"ROBUS" IMPROVED RETORT SETTINGS, with COKE, TAR, and BREEZE FURNACES.

THE ABOVE SETTINGS & FURNACES ARE PROVING EMINENTLY SATISFACTORY.

Every Particular, with Estimates, forwarded upon Application to

MESSRS. J. & H. ROBUS,

CONTRACTORS FOR THE ERECTION OF GAS & WATER WORKS,

37, WALBROOK, LONDON, E.C.

SAML. CUTLER & SONS, MILLWALL, LONDON,

CONTRACTING GAS ENGINEERS,

Manufacturers of GAS-WORKS APPARATUS of every description.

Livesey & Tanner's Patent TAR AND LIQUOR OVERFLOWS and TAR SCREEN for Hydraulic Mains.

TESTIMONIAL.

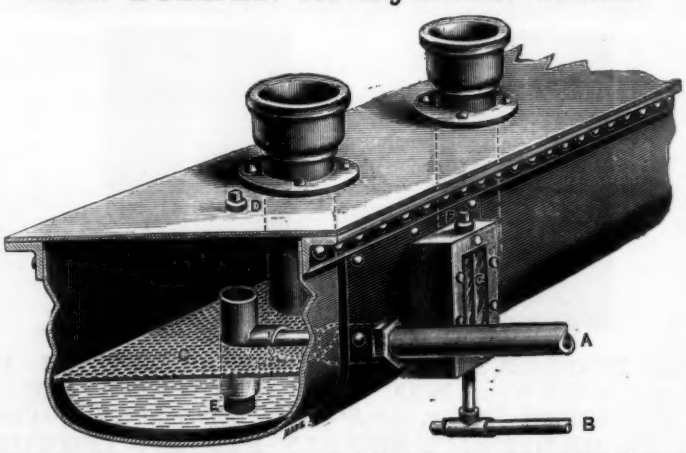
Croydon Commercial Gas and Coke Company.
May 29, 1888.

MESSRS. S. CUTLER & SONS,

GENTLEMEN,—In answer to your letter of the 26th inst., I am pleased to be able to say that I am so satisfied with the LIVESEY AND TANNER TAR OVERFLOWS which I have had in use during the past winter, that I have recommended their adoption throughout our retort-houses

I am, yours faithfully,

J. W. HELPS.



TESTIMONIAL.

Gas-Works, Tunbridge Wells, Feb. 15, 1889.

MESSRS. S. CUTLER & SONS,

GENTLEMEN,—In reply to your inquiry respecting LIVESEY AND TANNER'S TAR AND LIQUOR OVERFLOWS, I have much pleasure in saying that they continue to give every satisfaction.

A few months ago I had a very striking proof of their value. I started four beds without the "Overflows," allowing the Tar to travel along with the Gas, when the illuminating power dropped a candle, and did not regain the loss until the "Overflows" had been put into operation. This experiment was repeated with the same result.

The apparatus requires but little attention; and if a small quantity of tar is run off regularly every morning, nothing further is required.—Yours faithfully,

ANDREW DOUGALL, Jun.,
Assoc. M. Inst. C.E.

Index to Reference Letters in Illustration.

A, Tar-Pipe. B, Liquor-Pipe. C, Perforated Tar Screen, to prevent oscillation of liquor. D, Plug in top plate for access to nipple by special key. E, Nipple to adjust to within, say, ½ inch from bottom of main. F, Plug for access to nipple to adjust liquor level and for cleaning glass. G, Glass to see levels of tar and liquor in main.

MORRIS AND CUTLER'S PATENT "PERFECT" CONDENSER.

CUTLER'S PATENT SCRUBBER DISTRIBUTORS.

CUTLER'S PATENT WATER-VALVES FOR PURIFIERS.

WARNER'S RETORT-HOUSE MACHINERY.

[*As Illustrated and Described in the* JOURNAL *for May* 4, 1880.]

Communications to be addressed to

W. J. WARNER, GAS-WORKS, SOUTH SHIELDS.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD,

ALDWARKE MAIN GAS COAL.

This Coal yields 12,600 feet of 19-candle gas per ton.

Weight of illuminating matter in pounds of sperm, 820·80. Very free from impurities.

JOSEPH CLIFF AND SONS,

THE ORIGINAL (ESTABLISHED 1795). **WORTLEY FIRE-BRICK WORKS,**

NEAR LEEDS.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

AT THE PARIS EXHIBITION, 1878,

THREE MEDALS AND HONOURABLE MENTION

WERE AWARDED TO

JOSEPH CLIFF & SONS,

For their Various Exhibits, amongst which is a

SILVER MEDAL FOR THEIR PATENT MACHINE-MADE RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this Class.

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

GEORGE ORME & CO.,

GAS ENGINEERS

MANUFACTURERS OF

IMPROVED WET & DRY METERS

IN CAST-IRON AND TIN-PLATE CASES.

WET METER.

Meters Supplied with Harding's Counter and Grey's Index.

ALL SIZES IN STOCK, AND ORDERS PROMPTLY EXECUTED.

ORME'S GAS REGULATORS

(*BEHL'S PATENT*)

FOR STREET LAMPS.

MORE THAN 150,000 IN USE.

ADOPTED BY THE LEADING LONDON AND PROVINCIAL GAS COMPANIES.

GOVERNOR BURNERS

(*BEHL'S PATENT*)

FOR DOMESTIC USE.

PATENT

SUSPENSION REGULATORS

TO WORK ON THE DOWN PIPE,

For Regenerative and other Lamps.

Price Lists and Full Particulars on application.

DRY METER.

ATLAS METER-WORKS, OLDHAM. TELEGRAPHIC ADDRESS: "ORME OLDHAM."

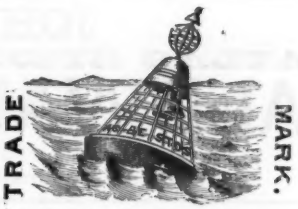
BELL'S ASBESTOLINE.

REGISTERED.

All kegs are labelled as above.

ADVANTAGES OF ASBESTOLINE.

ASBESTOLINE is the most efficient Lubricant for all bearings.
ASBESTOLINE is the cheapest Lubricant.
ASBESTOLINE saves from 50 to 90 per cent. of the Cost of Oil.
ASBESTOLINE is the cheapest Lubricant.
ASBESTOLINE is favoured by Insurance Companies.
ASBESTOLINE is the most Inodorous Lubricant.
ASBESTOLINE is the safest Lubricant from Ignition.
ASBESTOLINE has beaten all other Lubricants in trials.
ASBESTOLINE is applicable in and out doors in every Climate.
ASBESTOLINE requires no special application.



CONSISTENCY OF ASBESTOLINE.

ASBESTOLINE, to meet all circumstances, is made in four degrees of consistency—A, B, C, and CC.

ASBESTOLINE, A, is specially adapted to ordinary Land Engines and Machinery, in and out door, in this country.

ASBESTOLINE, B, a little more solid, is for use on Steamships in temperate climates, also on land when it is desirable to have Lubricant stiffer than A.

ASBESTOLINE, C, is for use in tropical climates, both ashore and afloat. It is also invaluable in works in this country when the temperature is high.

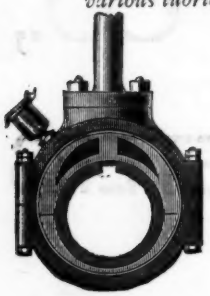
ASBESTOLINE, CC, is designed for use on Calenders, Paper-Machines, &c., where the bearings are heated by steam passing through, and sometimes is advantageously used instead of C.

The reputation of Asbestoline as a Lubricant of the highest efficiency in every kind of Machinery is established; and it has never been equalled by any other Lubricant in the numerous cases of special difficulty in which the best oils are ineffectual. It is used with marked success in Steel and Iron Works, Collieries, Cotton and Wool Mills, and other Textile Manufactories. In Corn-Mills it has proved invaluable on the roller and other modern machines. In Saw-Mills, on machines going up to 5000 revolutions per minute, its work has never been approached by any other Lubricant. On Electric Lighting Machinery, and in Steamships of all sizes throughout the world, the success of Asbestoline is unequalled. Many engines and machines of all descriptions give trouble, and show bad results both in working and wear, when the system of lubrication has not received due consideration. Engineering firms of the highest standing have given to it their powerful testimony and support.

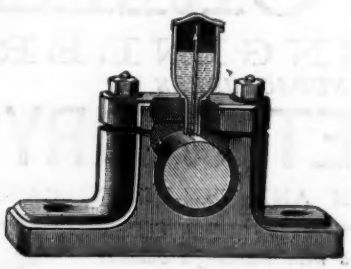
Supplied in Kegs, 28, 56, or 112 lb. Price, 2/3 per lb. Kegs Free. Special Terms for Large Quantities.

IMPORTANT TO EXPORT MERCHANTS.—*One pound of "Asbestoline" equals 2 gallons of Oil weighing 18lbs.; consequently the saving in freight is very considerable. Liberal Terms are conceded to Export Merchants.*

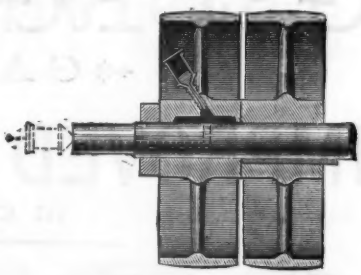
Below will be found illustrations of the mode of fixing Lubricators for Asbestoline to bearings. Full particulars of the various lubricators supplied for Asbestoline, and the manner of fitting, in catalogue free on application.



Lubricator fitted to Eccentric of Vertical Engine.



Showing Section of Lubricator fitted to ordinary Bearings.



Lubricator in different position for Loose Pulleys.

THE ATTENTION OF

ENGINEERS, AND ALL USERS OF STEAM POWER AND MACHINERY,

IS SPECIALLY INVITED TO THE FOLLOWING REPORT.

Owing to the number of Greases now offered, samples of BELL'S ASBESTOLINE were submitted to Otto Hehner, Esq., for analysis, and the subjoined Report fully proves BELL'S ASBESTOLINE to be the safest as well as the best Lubricant for all purposes:—

The Laboratory, 11, *Billiter Square, E.C., London, May* 3, 1888.

I have subjected a sample of Bell's Asbestoline taken from the stores of Messrs. J. Bell and Son, in Southwark Street, to a number of tests, in order to ascertain whether its use in Mills or Factories might contribute to the danger from Fire.

I found that Asbestoline **ignites only with the greatest difficulty** when brought into contact with flame; that wood and other combustible material soaked in Asbestoline burns, if anything, with greater difficulty than by itself; that its **flashing point is so high that it lies beyond the range of Mercurial Thermometers**; and that consequently no friction obtainable in the ordinary run of machinery is capable of developing inflammable vapours from it.

Bell's Asbestoline is **as absolutely safe a Lubricant as can be desired or obtainable.** In the case of fire breaking out from any cause, it does not assist the conflagration; and it is **quite incapable of leading to spontaneous combustion**, either by itself or in contact with inflammable material.

From the physical nature of Asbestoline its use is of necessity perfectly clean and free from waste.

(Signed) OTTO HEHNER, Public Analyst.

Illustrated Priced Catalogue, with numerous Testimonials by Leading Firms, free on application.

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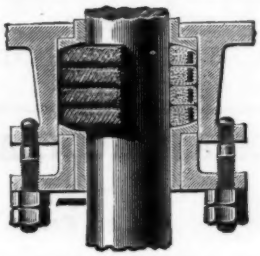

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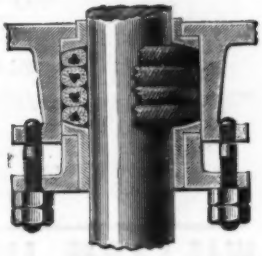

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Under this registered title are included the inventions of Mr. Field; and experience has proved them to be the MOST EFFICIENT, DURABLE, and ECONOMICAL PACKINGS ever made. They constitute such a combination of Asbestos and India-rubber as secures the maximum of elasticity and heat resistance; and they are, therefore, UNEQUALLED FOR EVERY KIND OF ENGINE. These Packings are being universally used by most of the leading Steamship Companies throughout the world for ordinary Compound, Triple, and Quadruple Expansion Engines of the latest type. The packings are composed of rolled Asbestos Cloth, but the India-rubber is placed in two forms to suit various cases.

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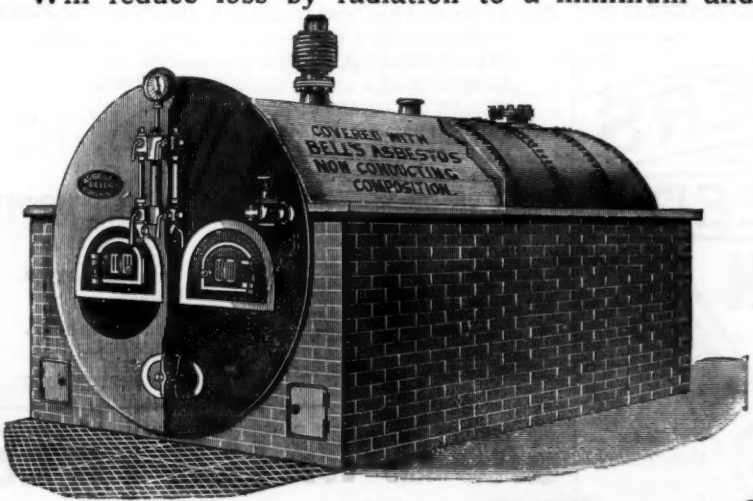
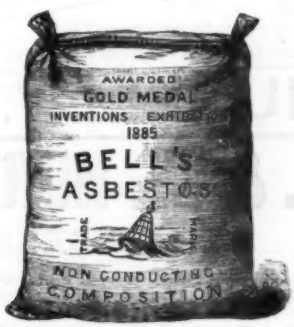
FOR COVERING BOILERS AND STEAM-PIPES,

Will reduce loss by radiation to a minimum and save 40 per cent. of fuel.





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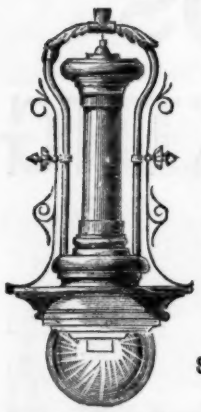

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MOST INTENSE WHITE BRILLIANT GAS LIGHT.
MOST ECONOMICAL, SIMPLE, AND DURABLE.
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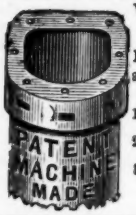

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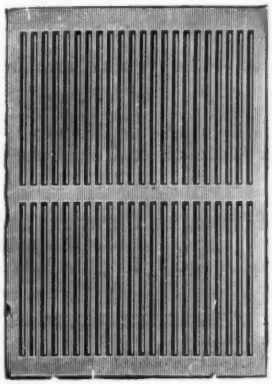

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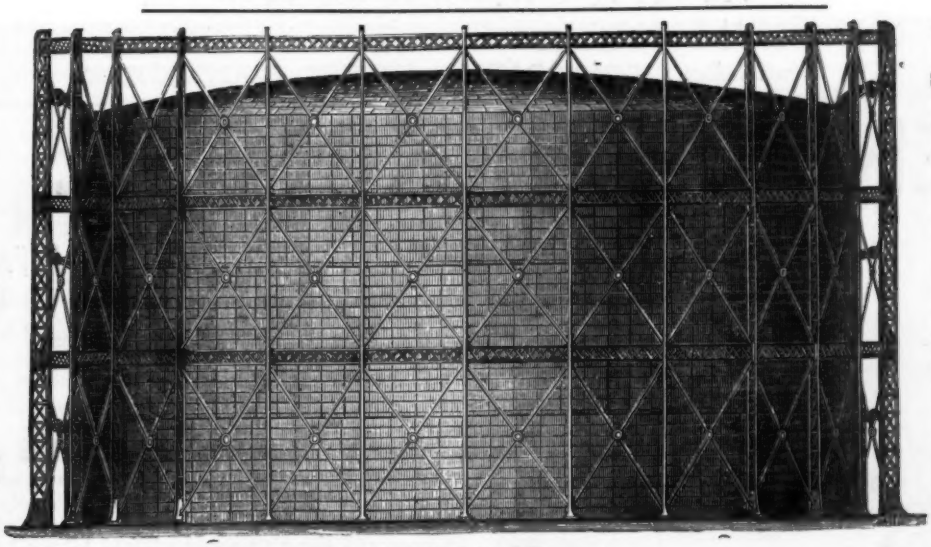

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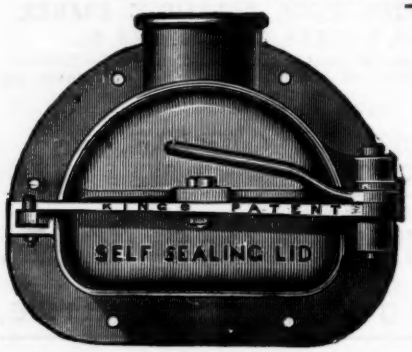
POWER CHARGING AND DRAWING MACHINES, driven by Wire Rope, Steam, or Compressed Air.—The power machines are applicable to circular, oval, or D-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made; they are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.



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N.B.—The whole of these Fittings are made of Wrought Iron.

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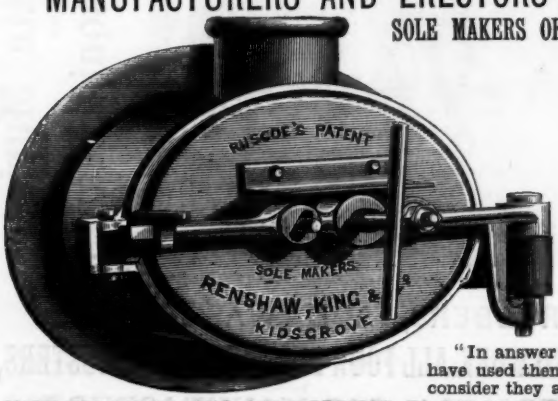
SOLE MAKERS OF RUSCOE'S PATENT SELF-SEALING RETORT LID AND FASTENER.



This Lid and Fastener is specially designed for taking up the wear and tear caused by refacing the Mouthpiece and Lid, hitherto in a large measure overlooked; and, in addition, from the special way in which the Lid is attached to the Cross-bar, the Lid has free action, and thus secures a more uniform scrape over the whole surface when being forced home by the Screw, the closing pressure being much more equally distributed than in any other form of fastening. The Lid itself is well ribbed, internally and externally; thus securing the Tightest, Strongest, and Simplest Lid in the Market, and the most easily adapted to existing Mouthpieces. The Cross-bar being of steel, it is not liable to be strained, and there is no Eccentric to wear and become inoperative.

"In answer to your inquiry as to Ruscoe's Patent Retort-Lids, we beg to say that we have used them in several works, and are thoroughly satisfied with their action. We consider they are the best in the market.—G. W. STEVENSON & SON."

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